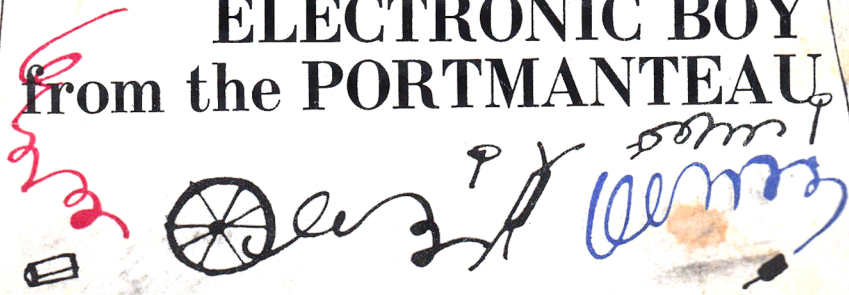




YEVGENY  
VELTISTOV

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**ELECTRONIC BOY**  
from the **PORTMANTEAU**











# Unreal Adventure

Progress Publishers • Moscow



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Электроник — мальчик  
из чемодана

*На английском языке*

*First printing 1969*

*Printed in the Union  
of Soviet Socialist Republics*

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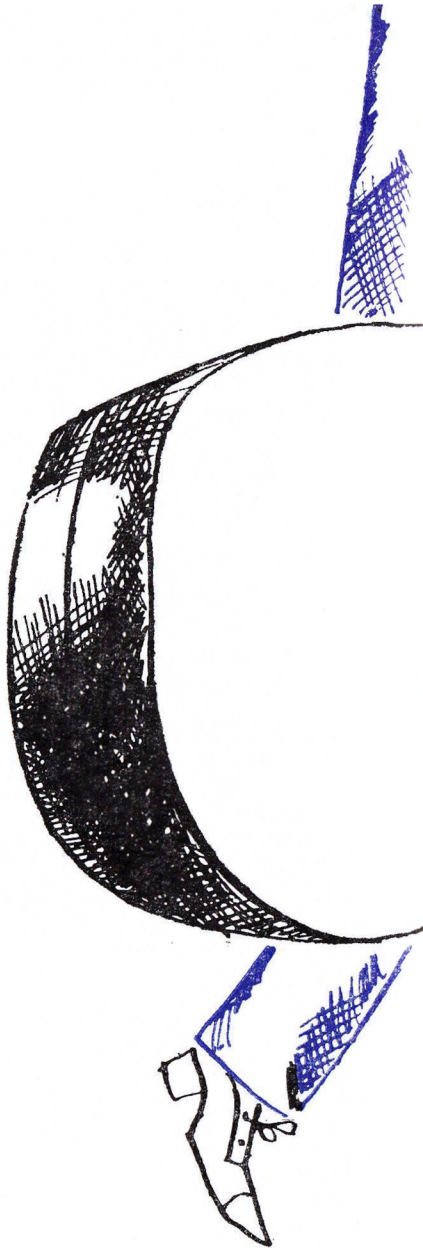
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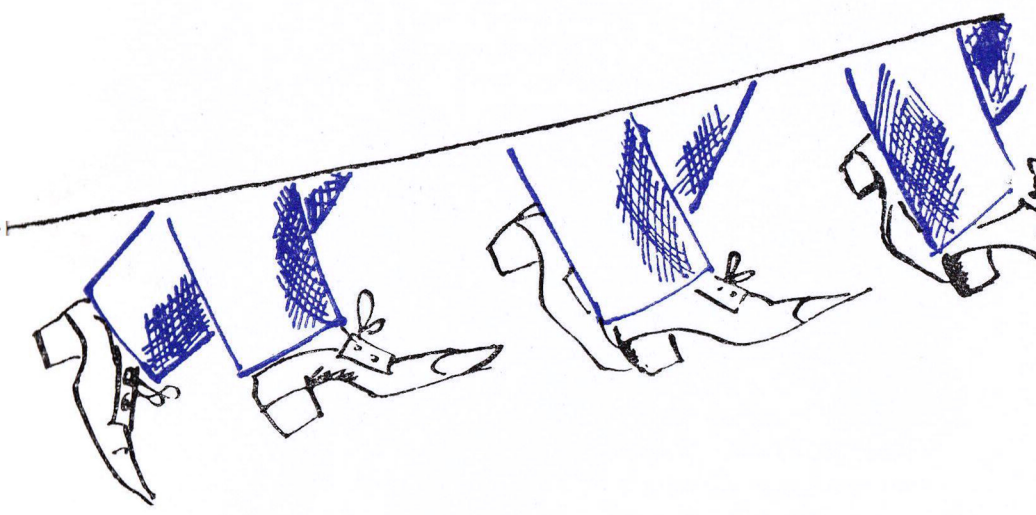
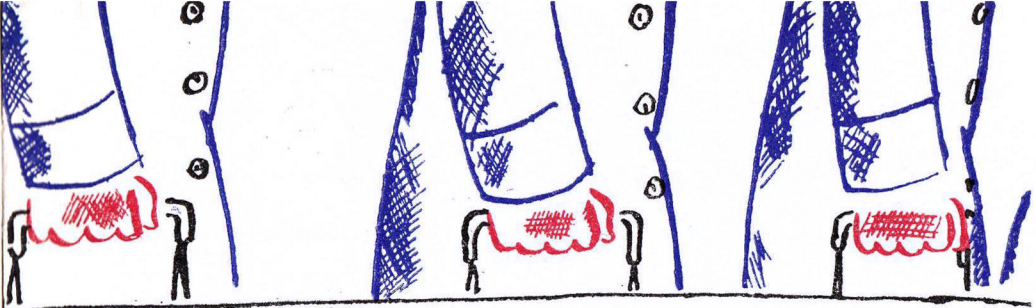
You've probably guessed what Electronic is? Right, he's a boy-robot! But the cream of the joke is that, by sheer chance, he turns out to be the live double of a schoolboy, Sergei Cheesekov. They meet and make friends—and immediately fantastic and funny adventures happen to them both. Sergei quickly gains fame as a World Champion runner, an animal-trainer, and an honour pupil at school—but that's enough. . . . Read the book yourselves, and join Sergei and Electronic at a maths lesson in a Moscow school, see the circus with them, and visit the cybernetics laboratory of Professor Gromov. Finally, when the cat's out of the bag, and their secret is discovered—join the children when they teach Electronic to laugh. Wouldn't it be fun if you had a friend like Electronic?

If you enjoy the book, write us for more of the same kind, or tell us what kind of stories you like.

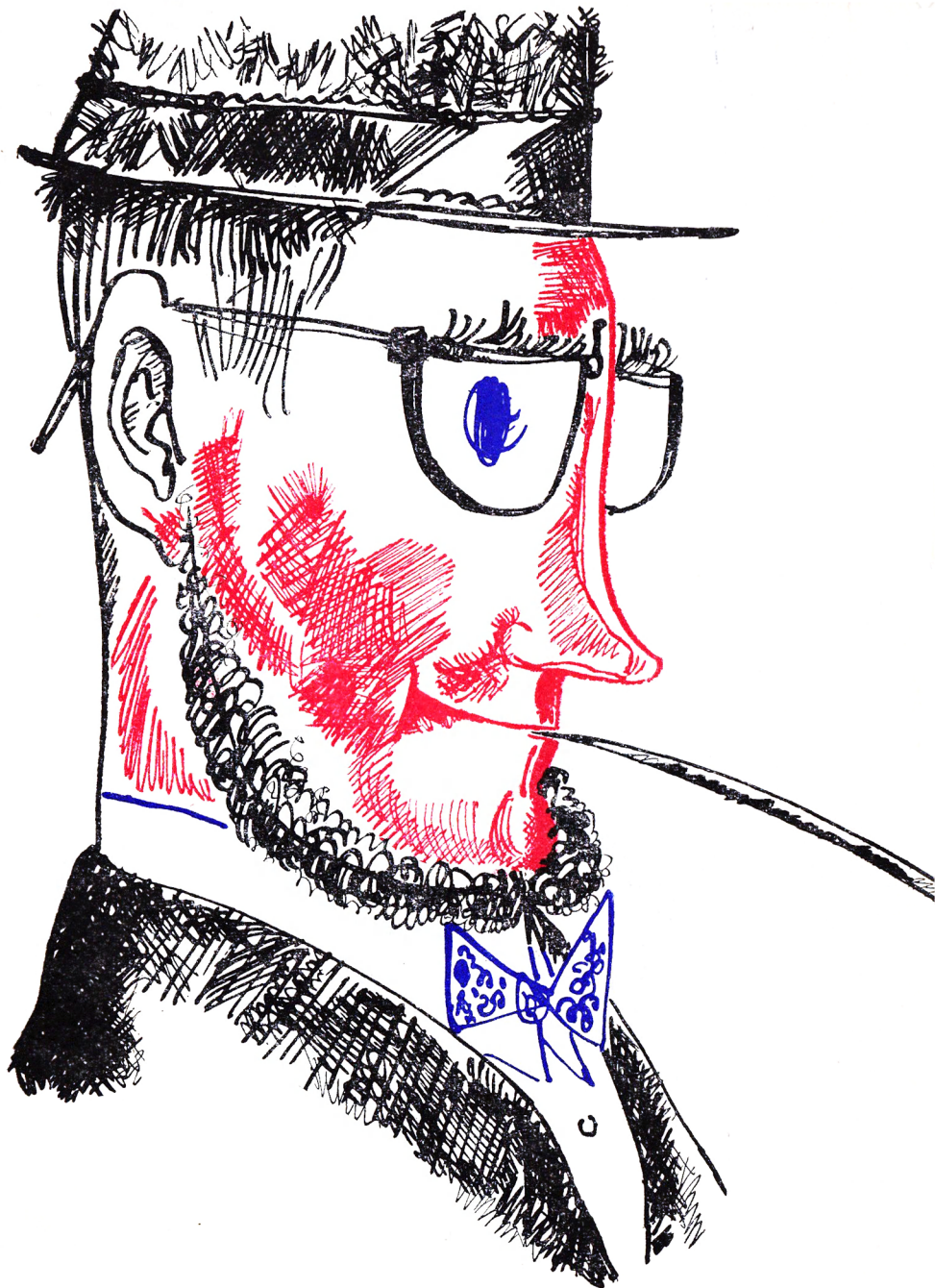


**The Four-Handled  
Portmanteau**









One morning, early in May, a light-gray motor-car drew up before "The Oaks" hotel. Pipe in mouth, a slim, wiry man threw open the car door and swung lightly out. He gave an embarrassed smile as he caught sight of the welcoming committee waiting with their bouquets, and hurried to meet them. It was Professor Gromov, come from the Siberian Research Centre of Sinegorsk to the Cybernetics Conference. As usual, he had decided to stop at "The Oaks".

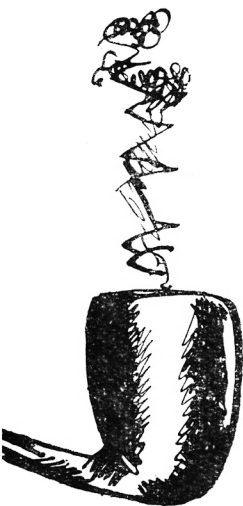
The hotel manager, who had arranged this special reception, embraced the new arrival warmly and at once busied himself with the luggage. Sticking out of the open boot was the rounded corner of a large portmanteau.

"Hold on! Even a strong man like you can't lift that," said the professor, noticing the manager peering into the boot. "That's an extra heavy case."

"Nonsense," replied the manager. He picked up the case and just managed to set it on the ground, his face red from strain. The portmanteau was long, black in colour, and had four handles. In shape, it reminded you of a giant fiddle-case. However, an inscription indicated the exact contents: **HANDLE WITH CARE! FINE INSTRUMENTS!**

"Whew! Well," said the manager, shaking his head, "however did you move it around, Professor?"

"Hired four porters. And I just gave orders!"



"We kept your usual suite. Is that all right?"

"Wonderful. Much obliged, indeed."

The manager and three porters took hold of the portmanteau by the handles and carried it up to the first floor. Following, the professor eyed his sitting-room with satisfaction—soft blue walls, comfortable furniture, a small work-desk at the wall-size window. He sniffed the scent of pine in the room, and smiled.

The manager pressed one of the push-buttons by the door.

"You're not restricted to pine. You may have meadow-sweet, if you wish, or violets, or even the cool of a frosty day. These buttons are the scent controls. For any mood, you might say."

"Pine is all right. Would put anyone in a good mood," the professor assured him.

"We hoped it would. Now I'll let you relax and get settled." And the manager quietly left the room.

The professor threw open the window. With a leafy rustle, the morning breeze rushed into the room and swirled the transparent draw-curtains. Beneath the window stood a cluster of hardy young oaks; the sun's rays pierced through their shaggy tops and dappled the ground with a pattern of light. Far away, the swish of tyres. Above the trees, the whir of a small helicopter—an air taxi.

Gromov smiled: he had somehow never got used to those helicopters, and had taken an ordinary taxi for which he had been well rewarded. A wonderful drive! From the station, they had driven past mile-long flowerbeds, along an endless avenue of trees in green leaf. No matter where you looked, everywhere something new: a group of birch trees, a ring of slender pines, apple and cherry trees veiled in white bloom, flowering lilac. . . . Overhead, hanging gardens on the roofs of buildings, protected from bad weather by translucent cupolas which slid open or shut. In the spans of wall between each row of floor-windows, and girding the buildings like shining ribbons, there was also greenery—twisted braids of ivy tight-clung to stone and concrete.

"The oaks have grown," the professor said to himself, looking out the window. "It's been years."

He bent over the portmanteau, released the catches and lifted the lid. Inside, his eyes closed, a boy lay full length on padded blue nylon. He seemed fast asleep.

For a few minutes the professor looked thoughtfully at the sleeping figure. No, not a soul would guess, right away, that it was a cybernetic boy. Turned-up nose, tousled hair, long eyelashes. . . . A blue windbreaker, shirt, summer pants. Hundreds, thousands of such boys ran the streets of a big city.

"Well, we've got here, Electronic," said the professor softly. "How do you feel?"

A flutter of eyelashes and the eyes opened—bright, lively eyes. The boy stirred, and sat up.

"I feel fine," he said, in a rather hoarse voice. "But a little shaken up, to tell the truth. Why did I have to stay in a suitcase?"

The professor helped him out and began to straighten the boy's clothing.

"For a surprise. You ought to know what a surprise is. But we'll talk about that later. . . . But now, you need re-charging."

He settled Electronic in a chair by the wall, took from beneath his windbreaker a small electric plug, with a stretchable cord attached, and pushed it into the wall outlet.

"Oh!" Electronic let out with a jerk.

"Never mind, never mind, it's not as bad as all that," said the professor, soothingly. "And it's necessary. You'll be moving around a lot today. Have to build you up with a charge of electricity."

Leaving Electronic on the chair, the professor went over to the video-phone and dialed a number. The TV screen began to glow, and Gromov saw the face of a resolute young man.

"That's right, Alexander Sergeyevich. I'm already here," said Gromov merrily, puffing away at his pipe. "How do I feel? First rate!"

"No more . . ." from behind his back, Electronic's voice rose to a high screech. "I can't stand it. . . ."

The professor wagged his finger at Electronic, and continued:

"Come over, I'm waiting. . . . But I warn you, you've got a surprise coming!"

The screen darkened. Gromov turned to ask the boy why he was so contrary. But he was too late. Electronic sprang from the chair, ran to the window, climbed over the sill, and jumped—from the first floor up.

The next moment the professor was at the window. He saw the flash of a blue windbreaker between the trees.

"Electronic!" Gromov yelled. But the boy had already disappeared.

Shaking his head, the professor took his glasses from his pocket and bent over the electric outlet.

"Two hundred and twenty volts!" Alarm was in his voice. "Whatever have I done!" And rushed to the door.

Running down the stairs, the professor met the astonished manager and reassured him with a wave of his hand. No time now for explanations.

A taxi stood by the pavement. Gromov jerked open the door and tumbled into the back seat. He caught his breath, and ordered the cabman: "Quick! Try to catch that boy in the blue windbreaker!"

So began the unusual incidents that drew many people into a vortex of excitement.













## WHITE LAB-COAT, OR FORMULAS?

In a big city there lived a very ordinary boy—Sergei Cheesekov. In appearance he was not at all remarkable: turned-up nose, gray eyes, long eyelashes, hair always tousled; not very hefty, but wiry as a whip. His hands were all scratches and ink, his shoes scuffed from football tussles. In short, Cheesekov was just like all thirteen-year-olds.

Six months ago his family had moved into a big, yellow and red brick block of flats in Linden Avenue, previously having lived in Pea Lane. Surrounded by giant buildings, it was odd indeed how this last little island in the old city could have survived so long—Pea Lane with its tiny houses, and courtyards so small that a window was sure to get broken every time the boys dared play ball. But for half a year now there had been no Pea Lane. Bulldozers had pulled down the houses, and at present the long-armed cranes were running things.

Sergei liked his new surroundings. Search the city through, he was sure you would not find such marvellous courtyard: it was big as a city square, fresh and green as a park. You could put in the whole day there and not get bored. In any case, you could always go to the communal workshop: plane and saw, or make models, to your heart's content. Or else head for the big recreation room—shoot billiards, read magazines, or watch TV on the big screen set in the wall like a huge mirror.

There were times he would just lie on the grass and watch the clouds racing by high above the yard—cloud-birds, cloud-gliders, cloud-rockets sweeping across the blue sky in the wind—or maybe a golden waterfall of sunshine, or a gleaming shaving-curl of a moon. Or darting straight at him from over the roof a great silver plane: a passenger jet-liner whose wings would shade the whole yard for a second, and as suddenly disappear, leaving only a thunderous roar resounding from the roof.

And the new school—there it stood in the centre of the courtyard—also thrilled Sergei. The classrooms had white desks,

yellow and green and blue “blackboards”. But go into the long corridor, and you saw a whole wall of glass: sky and clouds, trees and bushes—the school a ship sailing through green waves. But the most important, the most interesting of all, were the computers in the laboratories. Large and small, shaped like filing cabinets or TV sets or typewriters—they hailed Cheesekov with a merry clatter of keys, giving him friendly winks with their multi-coloured eyes, good-naturedly buzzing their endless song. The school took its special name from these brain machines: Cybernetics Vocational School.

When he had only just come to the new block and been registered in Form Seven B, before even glimpsing the computers, Sergei told his father:

“Well, I’m in luck. I’ll make a robot.”

“A robot?” said Pavel Antonovich in surprise. “Whatever for?”

“What d’you mean? What for! To go to the baker’s, wash the dishes, get dinner.”

And he immediately began to list all the chores the robot might do in his place, till his father interrupted him:

“Well, that’s enough day-dreaming! Tomorrow you’ll learn all about it in school.”

“And he could shine the shoes,” muttered Sergei, from under the blankets. And fell asleep.

But by the following day, Sergei had already forgotten he intended making a robot. After school he tore into the flat like a whirlwind, threw his schoolbag down in the hallway and recited, panting:

*“A” and “B”*

*On the chimney sat;*

*“A” fell, to his cost,*

*Then “B” got lost;*

*But what still sat?*

*Please tell me that!*

"Well now, really!" laughed his father. "Our cybernetics specialist has made a discovery. It seems to me they learn that in kindergarten."

"All right," said Sergei, "if that's kindergarten stuff, suppose you guess the riddle."

Pavel Antonovich started for his room, but Sergei stuck to him like a burr.

"Oh, Sergei, leave me alone! I'll be up half the night, I've some drafting to do."

"No, you don't get out of it that easy! Guess, what *was* left on the chimney?"

"I suppose 'and'?" His father shrugged his shoulders.

"And there your reasoning is old hat already," said Sergei, and continued with importance: "Let's assume *A* is a chimney-sweep and *B* a stove-maker. If both fell down or got lost, how could 'and' be left? It's not something real you can touch, you can't drop it." Sergei made a short pause and smiled craftily. "But you're right, too. Since you noticed it was left there, the word bears important information. Namely, it shows there's a close connection between object *A* and object *B*. Though 'and' is not a real object, it exists, and helps people understand each other."

"A bit too clever," mused Pavel Antonovich, "but I thought we've always understood each other."

"The way I see it, it's all very simple," his son continued. "Each letter, every word, even a thing, even the wind or the sun, contains information of some kind. You, for instance, read the paper and it gives you the *news*. I work out a problem: using formulas, I get the answer. Somewhere on the ocean, a captain has the safety of his ship in mind when he looks to see what kind of sea is running, what the wind is like: direction, speed. We all do one and the same thing. We take some kind of information, put it to work, and try to get good results. That's the main law of cybernetics!"

But after listening to this scientific speech, Sergei's father drew an unexpected conclusion:



"That means, if you bring home only 'average' marks and then say: 'But I knew all the work, I really did,' we don't have to believe you but only the results shown in your Daily Report Book. A very clever law, that!"

"Well, I'll do better than get 'average' marks now; I'll get Excellent in every subject," said Sergei with conviction. "I'll learn all about calculators, about people, and even the Government."

Laughing, Sergei's father grabbed him by the shoulders and waltzed around the room.

"Oh, you! Commander of robots and a statesman! Want your supper? There's some delicious fruit compote."

"Who cares about compote?" yelled Sergei. "Wait! I haven't finished. I haven't decided what to be yet—a programmer or an assembler."

They talked the whole evening, but could not decide which was better. And even long after, Sergei could not decide what to study—computer programming or calculator assembly.

If he chose assembly, engineering, that is, after a year he might be bending over blueprints dressed in a white lab-coat. And with his own hands he would assemble complex units—tiny electronic structures. If he wanted to, he could learn to make any kind of machine he pleased: an automatic steel smelter, remote controls for combine-harvesters, or a programmed diagnostic-computer for doctors. Even miniature television sets which could relay information from outer space, or from the ocean depths, or from deep down under the earth's surface. Why, those crazy old wizards in fairy-tales never dreamt up such things!

But there was one snag that bothered this young wizard: his white lab-coat must always be spotless. A dust particle, a bit of fluff, an ordinary speck of dirt, might spoil the assembly of a whole machine! But to be that careful was not in Cheesekov's nature.

The programming pupils went in for theory: they tackled equations and did sums, either on the blackboard or at their desks.

You see, they worked out the mathematics for the programming material to feed the computers made by the assembly pupils. At first sight, perhaps, this was not so interesting as designing highly skilled automation-controls. But after all it was the mathematicians who so passionately battled with the problems of electronics. Not for anything else in the world would they exchange their weapons—theorems and formulas. And how proud they were when they came up with the answers.

So, white lab-coat or formulas? No need to decide it right now, for good and all; not today but only in the autumn. However, Sergei was continually pulled this way and that by his contradictory desires. There were days when his passion for mathematics blazed up, and he would sit by the hour over his text-books. He would proudly show his father how he had straightened out a most difficult problem. They even made a game of inventing equations of their own, using aeroplanes and cars, wild animals in the zoo, trees in the woods.

But after a while, before he quite realised it, Sergei's passion for mathematics died out, and he was lured—as if pulled by a magnet—towards the laboratory doors. Once, choosing the right moment, he entered when a different class went in; sat in a corner, and watched the older boys mess about with the tiny structures. A computer sang and buzzed its song, its eyes glowing like coals. Sergei was in his element.

But after such flare-ups for engineering, there was bound to be some unpleasantness: his father had to sign his Daily Report Book. Pavel Antonovich would look at his son with reproach and shake his head. Sergei would turn away and stare hard at the bookcase, shrugging his shoulders.

"Well, so I couldn't get the answer. . . . What's the use of such a problem, anyway? Some fool pedestrians . . . they walk a while, then they stop, then they take a train. . . ."

"And now you can do it?"

"Yes," said Sergei in a tired voice. "But I can't sit so long over maths. . . . It gives me a headache."

But excuses were no good, and he had to settle down and do problems. Sergei read, and read again, five lines about a farmer reaping a good harvest; but his mind was on a dog that had run after him for a long time one dark evening after school. Sergei had quietly whistled to the little fellow, looking back to see—had it run away? The dog had trotted after him, then stopped, sat down, and looked at him dolefully. There had been a white triangle on the dog's chest, one ear was erect, the other seemed broken in the middle. At his doorway, Sergei had been on the point of picking the dog up, when something frightened it. The animal dodged, and ran away.

Again Sergei stared blankly at his arithmetic book, rolling his pen idly along the table. Then he closed the book with a bang, and stuffed everything into his schoolbag. He had found the easiest way out: "I'll get the Professor to let me copy his."

The Professor, otherwise known as Vovka Korolkov, shared the same desk at school with Sergei. His notebooks were something. Any time you liked, they could be put on exhibition or displayed in a museum—not one blot, not one correction, did they have. Letters and numerals were all perfectly formed, in neat, fine handwriting. For that matter, their owner himself might well be displayed in a museum. The Professor knew everything in the world, beginning with molluscs and ending with outer space. But he did not put on airs, never turned up his nose at his friends. For him, there was only one thing in the whole world—that was mathematics. When he got hold of any kind of equation, the Professor forgot everything on earth. True, when Sergei could not solve a problem, the Professor would come off his lofty perch and prompt him to the solution. All you had to do was to give him a good dig in the ribs. But you could not call them close friends.

The Professor was a friend of Makar Gusev's, who sat in the front row and screened off from the rest a good quarter of the blackboard. They were a funny pair. The Professor was thin, pale, the smallest in the class, noted for launching his own home-

made rocket and for inventing other intricate gadgets. Makar was robust, ruddy with health, with fists as big as musk-melons. He boosted the fame of his chum and sometimes came out with surprising suggestions himself: skis run by tiny motors, oil-polish made from lemons, and so on. Makar was never tortured by doubts as to his future. When this came up, he would flex his muscles and say:

"Of course, it's machines for me, assembly. Take the Professor now, he's got a head on him. But he can rack it to pieces, for all I care. Maths! I wouldn't give tuppence for all the brains there are!"

If Sergei had quite a friendly feeling for the Professor, husky Gusev was a pain in the neck. From the first time the boys met, Sergei's last name struck Makar as absolutely priceless, too funny for words. Quite tickled by it, he never gave Cheesekov any peace.

"Hi, Cheesekov!" he would shout in his deep, bass voice, even from afar. "Do you like cheese, or don't you? Huh?"

If Sergei replied that he did not, Makar would go on:

"Then you must be Cheese-legs, or Cheese-arms or Cheese-ears!"

Sergei tried answering in the affirmative, but this did not make Makar shut up, either. He would make an announcement:

"Attention! Here comes Sir Cheese Cheesevich Cheesekov ... Sergei Cheesekov himself, the cheese expert, crazy about every kind of cheese in the world. Would you mind telling us, sir, did you have cheese for breakfast?"

Finally Sergei decided to say nothing. Not uttering a word, he would start for the classroom. But Gusev would bar his way, and ask loudly:

"Look here, what's yer name—Cheese-eyes? Yesterday, you know, I forgot it; couldn't sleep all night. Is it Cheese-skin? Cheese-muscles? Cheese-worms?"

Sometimes Sergei got so angry at this badgering he was ready to punch Makar. But he did not want to be the first to start;

Makar never started fights either. So the only thing left to do was adopt the methods of his enemy. And during the lesson, Sergei carefully chalked something on Makar's back, which was always right in front of him. The class tittered when they saw the word "GOOSE"\* and Makar looked round with suspicion, wondering what was up. During the break, he chased Sergei but the latter was too quick for him. And Makar could only shake his great melon-fist from a distance, as a threat.

But whenever Victor Popov and Spartak Nedelin of the 9A showed up, all such minor grudges were immediately forgotten, all little scuffles going on in out-of-the-way corners suspended. However hard you tried, it would be impossible to find anyone in the whole school who did not know the maths experts. Stories about these legendary figures made the rounds. A crowd of boys would follow the famous pair and exchange the latest news.

"Boys, Nedelin just knocked over a terrific scalene—you know, a triangle with no sides alike. For him, it was nothing: he took hold and knocked the stuffing out of it. And that's not all; Spartak proved one of the hardest propositions!"

While all this talk was going on, the celebrities took not the slightest notice of their gawking admirers. They strolled leisurely along the wide hallway asking each other riddles about music. One would whistle a melody, or sing in undertones; the other had to guess the composer. Finally the bell would ring, the 9A-form doors close, and the school had to wait for further news.

And the news covered a wide range:

"Did you hear? Nedelin argued with the teacher the whole lesson. He stuck to his point, and the teacher to his. It was like that right up to the bell, they say."

"It is easy for him. He knows a terrific lot. But with us it's different. And you don't get a chance to keep your seat, minding

\* Gusev—from the Russian word meaning "goose".

your own business, before they haul you up to the blackboard.”

“Did you notice Spartak’s wearing a red football jersey? Shows right through his shirt. Again he’ll be piling up goals against the Biologists!”

“So what? It’s mostly girls who go in for biology. Only a few boys—all of them scrawny. They can hardly scrape up a team. Doesn’t take a genius to clobber *them*. . . . But that Popov, did you know he bought a new violin? He gives such concerts, none of his neighbours get any sleep.”

“Well, I live in the flat below Spartak myself. Two storeys down, that is. You know how he pounds the piano! I wouldn’t give that for your violin! A piano can be heard through a whole ten storeys.”

“What are you sporting glasses for? Trying to look like Victor Popov? He’s a sissy. Can’t even kick a ball. Watch out you don’t end up a goner with those four eyes. An ounce of health is worth a ton of learning!”

“Sissy yourself! I do push-ups every day. And my broad jumps are better than yours, too!”

Easy to see the fans were divided into two camps. Some copied the thoughtful, serious Popov, who regarded high jinks with a certain irony. Others idolised the lively, muscular Spartak, and put a halo round athletics and games. The latter tried to compose poetry like Spartak, too—and who knows if their efforts were better or worse than his, which came out in each issue of the school newspaper? On one count, both camps were agreed. Mathematics was the thing to live for. That, and music.

Cheesekov, of course, was on Spartak’s side, though the great man ignored him completely. As for Popov, the young seventh-former avoided him after one little incident. Sergei was running along the corridor, when suddenly a door flew open, cracking him on the head. The one to blame, Victor Popov, was apparently busy with his thoughts. He did not even bother to look up to see who the victim was, and only threw out in passing:

“Watch your step, kid!”

Sergei was furious, not because he had got a whacking big bump on the head; no, it was Victor's condescending tone that did it.

"Who do you think you are?" he muttered, through his teeth. "I'd like to wham you one in the glasses. Next time you'd watch where you were going."

Popov stopped, looked at the unknown with astonishment, and asked unexpectedly:

"Look here, hothead, it'd be a lot better if you told me what 'Al-jebr' and 'al-mukabala' mean!"

Sergei answered nothing at all. He stood with his feet apart, hands thrust into trouser pockets.

"It's time you knew—they're Arabic mathematical works of the ninth century, from which we get the name Algebra," and Popov glanced at the "hothead" with obvious irony. "And, by the way, young man, the big Professors who visit our school call me 'colleague'. You hear? Col-league!"

And with that the skirmish ended. Victor Popov had long ago forgotten it. But Cheesekov remembered.

That was why, perhaps, when the affair was over, Sergei began to imagine a scene like this:

... Here he was two years later, a complete unknown, going into the university to sit for the Mathematics Competition. Modestly picking up the Examination Paper, he read over the problems in detail. Ten minutes—and he handed it in to the Judging Commission. The great room was loud with the scratching of pens, working at top speed; but he left without even looking back. The Commission read his paper, saw the brilliant solutions to every problem, a number of them never having been solved before. And they marvelled: "Who is this Cheesekov? He's never been to any of our Mathematics Circles, or come to any of our Maths Section Conferences; but how easily he solved everything, and so cleverly. Truly, he's the coming Shining Light in mathematics. Strange, there seems to be no problem he can't solve..." And the next day, the following announcement ap-



peared: "First place taken by Sergei Cheesekov. Honour and glory to him!" ...Articles in the papers, phone calls from the Academy of Sciences, new legends in school.... Victor Popov also heard about it, and offered his hand to the Prize Winner: "Forgive me, colleague. Even I couldn't solve such tough problems...."

And why not? Why shouldn't it happen just like that? Sergei had once read that the famous Stokes theorem saw the light of day while Stokes was still a student and was having an exam with the great Maxwell himself. To this day, the theorem bears the name of Stokes. So why shouldn't he one day discover a Cheesekov theorem?

But when Sergei was day-dreaming about what he would be, more often than not his ideas went skittering about, helter-skelter. His utter inability to stick to some one thing amazed even him.

"Why do I," he philosophised, "without any reason at all, start thinking about the Antarctic, then about Madagascar stamps, and forget I have to go to school? Sometimes I think pretty straight, other times I just can't; sometimes I study, other times I'm as lazy as the dickens. Sometimes I can do anything, other times I'm no good at all. Why is it, when I want it to, everything goes smoothly and turns out fine—lessons, tidying up the house, or a cross-country race. I needn't be a mathematician or an engineer, if I don't want to, but a lorry or cab driver instead; or a designer like Father is, and Mother. When I have Geography at school, something pulls at me to go to the Far North, work in a factory there, and spend my holidays in a glassed-in sanatorium. But when it's History, I want to excavate Scythian burial mounds, search for arrow-heads and shields and lances of long ago, discover the secrets of ancient parchments. And naturally I always wanted to be an astronaut! Why am I like this, that's what I'd like to know."

And Sergei asked his father:

"Dad, how did you know you wanted to be a designer?"

He had asked his father this probably a hundred times or more, though he had heard it all before—how his father finished school, then worked on a construction job in Siberia, driving a heavy, tip-up lorry, and then entered a technical institute to specialise in auto engineering. There he had met Mother. And while Pavel Antonovich recalled his youth with relish, Sergei's thoughts were far away:

"For some reason it was all so simple in the old days. Everybody knew what he wanted to be, and what he had to learn. But here I am—just like Ilya Muromets\* before the wayside stone-marker: I don't know whether to take the road to the left, or to the right, or go straight ahead. You feel so lost! . . ."

And again he remembered the dog that ran after him in the evening dusk. It had followed him for such a long time, and he had just been going to pick the dog up and take it home, when it ran away. "What was the fool dog afraid of?"

"What are you thinking about?" his father asked, breaking off his story.

"Dad, has a dog got any real sense? Does he understand what you say?"

"To my mind, he does. When he's well trained, he understands."

"But how can we know how he feels?"

"Probably you have to teach him to talk your language," joked his father.

"You don't have to tell me any more, Dad," said Sergei, referring to his father's back history. "I remember all the rest, now. But, Dad, I've definitely decided. I'm going to be a veterinary surgeon."

"Well, it's up to you!" Pavel Antonovich shrugged his shoulders and left the room.

"Maybe he's offended," thought Sergei.

\* Ilya Muromets—a legendary hero of Russian epic folklore, who had to choose between three roads, all leading to disaster in varying degrees, as indicated by a stone-marker or sign-post.

"To be a vet isn't a bad thing!" his father called out from the next room.

No, he was not offended.

Pavel Antonovich returned with a volume from the encyclopaedia set.

"Now we'll read up about vets," he announced.

"Not a bad thing!" muttered Sergei to himself, grinning sarcastically, while his father read aloud.

"Fixing up cats, and cows. . ." he thought. "Some job, I don't think! They don't understand anything—grown-ups. You say something, just off-hand, and they start making something of it. But when you really want to know anything important, they don't know. And they don't know what a dog feels, either! . . . All the same, what did that homeless mongrel want? Why did he run away?"

### WHO'S THE CHAMPION?

On Sunday, Sergei got up early. Not because he had anything special on. Simply because the morning happened to be so bright and fresh after the night's rain that it would have been foolish to waste it by staying in bed. On such a morning you always feel that something wonderful is sure to happen, something really unusual. Because it will be such a long day, you see, very long; and bedtime is far, far away.

Everything was quiet in his parents' room, and Sergei wanted to slip out of the flat without being seen. He turned the catch of the night-lock carefully, but all the same there was a tell-tale click.

"Sergei!" his mother called from the bedroom. She had heard.

"What?"

"Please go for the bread. And don't be late for your morning exercises."

Morning exercises are at 8 o'clock. First the bugle sounds: on

the football field appears a man in a red football jersey. That is Akulshin, Master of Sports, who lives on the second floor. He stands there, waiting till all the children come out-of-doors. After a warm-up run, they have jumping and rounders. So you see, morning exercises were not a bit dull, and Sergei had no intention of skipping them. But going for bread was one of his regular chores now. Whatever for, when you could have it brought right to the flat? Mother put it this way: simply so that he, Sergei, wouldn't grow lazy. . . .

"Two loaves?" he asked.

"Naturally. You know that," came from behind the bedroom door.

"We'll clear it up right now. Just a minute!" said Sergei loudly, smiling to himself as he pictured the bewildered looks of his parents.

He picked up the receiver, dialed three zeros in a row.

"Hello, Information? Where can I buy two fresh loaves?"

"Where do you live?" asked the mechanical voice of the Information Exchange.

"At 5 Linden Avenue."

After a few seconds of silence, the voice announced in the same tinny tone:

"There is a bakery in your building."

"Thanks for reminding me," answered Sergei, barely able to keep from laughing.

"What did it say?" cried his father.

"That the bread's still hot! And for you not to be late for gym."

"But we've never been late yet!" returned his parents in chorus, laughing at the joke.

It was true. All the grown-ups went to gymnastics eagerly, even the pensioners, old as they were. They took the lift to the ninth floor and got out on the roof. And there it was as nice as in the courtyard below: flowers, greenery, and a well-equipped gym floor in the centre. The pensioners, of course, did not join in the

difficult exercises on the flying rings: they only did squats and arm exercises. But Sergei's father was rather good on the cross-bar, doing full circles called Round-the-Clock; and he was a neat basketball shot too.

At such an early hour, there was not a soul in the yard when Sergei came out. Nobody to pass the time of day with. So he decided to go to a distant bakery; perhaps he might meet somebody or see something interesting. . . .

Slowly, Sergei strolled along under the shady lime-trees. Passing by, you might think he was deep in thought. But no. He was playing. He walked along the familiar street, but in his eyes it was absolutely new. Here was a freshly planted sapling, not there yesterday. Slender it was, like a plain stick, with no leaves. Never mind, soon it would be strong, with leaves rustling in the wind. . . . And here bulldozers had pushed up piles of earth to level a building site. Until carted away, they made a good place to hide in. . . . Somewhere you could hear the low rumble of a motor. Close your eyes and guess: an ordinary motor-car or an air-taxi? You had to guess quick, while the noise was still indistinct. Afterwards, see if you were right—and wave to the helicopter with the checkered air-taxi marking.

Below, across the river, the stadium bowl could be seen. Sergei looked at it: but he did not see a stadium. He saw the stone walls of the Roman Coliseum. He was no longer a seventh-former of the Cybernetics Vocational School—but a brave gladiator. Not wearing trousers and windbreaker, but iron armour. The roar of wild animals came from the dungeons. He had to fight tigers and lions; only his slashing sword could save his life. And he felt the heavy melancholy of a gladiator risking his life every day in the arena. . . .

No, better if the stadium were not the Coliseum, but a gigantic cyclotron! Of course, that's what it was! A proton-cyclotron, the biggest in the world—a huge round thing, like a circus ring. Inside, whirling round, were the particles, which make up an atomic nucleus. Of course they couldn't be seen with the naked

eye. If an atom were the size of a football field, its nucleus would be like an ordinary little ball. Only yesterday Sergei had heard about it during Physics. He was no longer Sergei Cheesekov, but a physicist. Picking up a photographic plate, through which particles had been shot, he put it under the microscope and stood looking at the marks on the plate, marks resembling brilliant ray-like stars. And he began to reason, like Sherlock Holmes: "What can these marks be? What kind of particles went through? Hm, hmm, how strange. . . ."

Suddenly a ray of sunlight struck his eyes. He forgot that one minute before he had been a physicist. Now he was in ancient Russia. In the distance rose the dark, massive walls of the Kremlin and, standing on guard on the high riverbank, was one of the Streltsi,\* none other but Cheesekov! Faintly he could hear the ring of blacksmiths' hammers, the hum of brisk trade going on in the rows of market stalls. Let them hammer, and haggle—this sentinel had sharp eyes. A tall old man was approaching, leaning on a long stick. Wait, it was the tsar himself, Ivan the Terrible, staff in hand! With a beard to his waist! What ideas hid behind that glowering brow! What orders would he have for his faithful warrior?

Ivan the Terrible stopped beside Cheesekov, aimed a piercing glance, and asked calmly:

"Could you tell me, young man, how to get to the Five-and-Ten?"

"I-I don't kn-know," Sergei babbled, bewildered. "That is . . . what am I saying? Of course I know! Straight, straight ahead and then turn left."

"Thank you," said the old man, not in the least surprised. And went away. Slowly. Quietly. Not at all now like Ivan the Terrible. . . .

The two large loaves were bought at the end of Linden Avenue.

\* Marksmen. In the 17th century, the Streltsi were something like a territorial military service.



On the way back, so time would not drag, Sergei played a game with the signs hanging over the shops. It was not hard to do: just read the signs in reverse, like in a mirror. That way you got such strange words, as if you were in quite a different world.

## CLEANERS GROCERY CHEMISTS

That was how the signs looked, reflected in the wide shop windows. And you pronounced them this way:

### STSIMEHC YRECORG SRENAELC

You could tie yourself in knots over such tongue-twisters!

Sergei began to remember a film he had seen recently. A very interesting one: "Earth Finds New World". About an anti-world. The way it started, an Earth space-ship was approaching a mysterious planet and launched a robot scoutship. This hadn't gone far before it blew up, just like an atom bomb. Apparently, the anti-world consisted of elements completely opposite to those of Earth, or the Sun, or even our whole galaxy—the planet and its inhabitants, and all the rest of it, everything, was made up of anti-particles with opposite energy charges. So they called the strange world "anti" meaning "opposite" and Earth astronauts had discovered it.

"Our electrons are units of negative electricity," said the space-ship Commander, "but theirs are positive. Our particles and theirs have only to collide and there's an explosion. . . ." Come to think of it, it was funny, this anti-world: throw an ordinary stone at it—an explosion; throw a stick—an explosion; drop something accidentally from a space-ship—again an explosion! But, in the film, while the astronauts were finding out what they had stumbled onto, a real war broke out. Everyone in the cinema were glued to their seats. All nerves were tense, it seemed so real. But Sergei remembered this film for a more interesting reason. In the anti-world everything was opposite, even left and right: our left was

their right. What a shame the anti-world cities were filmed from so high up. You could not tell whether they had shop signs or not. But the buildings were ultra-modern, something like plastic spheres. All the same, if they did have signs, then you would have to read them from right to left. . . .

Sergei came to a halt, struck by his discovery. He looked at the signs again, and pronounced them solemnly, as if reciting an incantation:

“ANIHC. YRECORG.”

In a flash everything around him changed. He was in the anti-world, reading anti-signs and looking into the cold glass anti-windows of a shop. And an anti-creature was staring at him from inside, through the glass window: his hair was combed from right to left, buttoned pocket was on the left, a watch on his right wrist.

“Hello there!” said Cheesekov. “I know who you are. You’re not my reflection at all, you’re . . . Iegres! I’m late for morning exercises now, but another time we’ll have a good chat. Good luck, Iegres!”

Waving good-bye and getting an answering salute, Sergei ran home.

“Of course, I went too far when I promised to talk with him again,” he muttered to himself, returning from the anti-world to Linden Avenue. “But just the same it was really something—meeting an anti-person. Well, almost an anti-person,” he added as an afterthought. “In any case, you can bet your sweet life his heart’s on the right side. . . .”

In the courtyard, the smaller ones had taken over the football field. Clear as daylight: he had missed morning exercises. It wouldn’t have been bad to have a game of rounders, but what could you do. It wasn’t just anybody who had kept him, but an anti-person. And as soon as Sergei turned the corner towards his entrance, he realised this discovery could bring him glory. He noticed some boys by the door at the far end. They were all in a

bunch: that meant they were trading long-hoarded treasures; or having a look-see at something. . . .

So it was. They were looking at the shirt one of his classmates, Vitya Smirnov, was wearing. Vitya stood there, showing off, with his nose up, hair every which way. But the shirt was absolute junk. Sergei could see that even at a distance. It had printed designs on it: ordinary petrol-run motor-cars, old double-decker buses, and even horse-drawn stage-coaches—coffins-on-wheels of the last century! If the shirt had the modern stuff of today—hovercraft jet-trains, electric autos, inter-continental liners, stellar space-ships, or maybe dirigible rest-resorts for tourists—then it might have been worth looking at. Just imagine though, being stuck up over that outdated nonsense!

“Hey, fellows!” he called, coming up. “I’ve just seen an anti-creature!”

In one second the proud shirt-owner was deserted and the boys surrounded Sergei. He had to tell his story several times over, how he had read the shop signs in reverse, remembered the anti-world from the film, and noticed legres in the shop window. It seemed all the boys had seen the film “Earth Finds New World”, all had noticed that in the anti-world left and right were reversed; but not one ever dreamed that right beside them, literally two steps away, they could see a real honest-to-goodness anti-person.

The discovery called for immediate confirmation. So the group darted off down the street to read the shop signs by this new method, and make faces in the shop windows. But Sergei went home on the run: a threatening voice had called to him from the balcony the very moment he was flushed with glory.

He listened resignedly to his mother’s reproaches, gulped down his breakfast, refused a trip on the river in a fast hydrofoil, snapping out of his lethargy only when he decided it was an absolute must to become a physicist and make a study of an anti-world. But where would you study it from—from Earth, or did you have to go somewhere in Space? How far did you have to fly, what

kind of space-ship did you need, and how keep from being blown up?... Dozens of questions spun round in Sergei's head, all demanding immediate answers. So he set off for Vovka Korolkov's, who knew everything.

"Most likely Makar Gusev has been hanging about there since morning," he thought, as he walked along. "And I'll not get a chance for a real talk. Only nonsense. How shall I get rid of Gusev?" To be on the safe side, Sergei resorted to incantation.

"You've gotta stay home, Goosey! You've gotta stay home, Goosey-gander!" he repeated firmly, as he climbed the stairs to Vovka's flat.

...Exactly! Just as he had thought. There was the Gander! Fooling about on the landing with some kind of tube, pasted over with black paper. . . .

When Gusev saw Sergei, he gave a big grin and said:

"We-ell Cheesekov, hello! See this tube? It's a telescope. Enlarges thirty times. The Professor and I invented it. Hey, Cheesekov, you want to be first to look at the stars?"

"But where's the Professor?" asked Sergei, very business-like.

"He'll come in a minute. Take a look! Now, before we start to use it."

Naturally on such a bright sunny day there were no stars at all to be seen. But Sergei, anxious to avoid trouble, bent over and put his eye to the round hole. He saw the sun—burning, blinding. Like a red-hot spear it shot right into his eye. Blinking in confusion, wiping away streaming tears with his fist, Sergei stood at the window on the landing. He wanted to give the telescope a good kick, but hated to spoil the Professor's work.

"Well, what did you see?" asked Gusev, maliciously.

"A stupid blockhead, like you!" Sergei shot at him angrily, and ran downstairs. "A flat-footed goose, like you!" he shouted as he ran. "Goosey-gander! Rotten fat gander!"

Makar did not chase him. He leaned out the window and bellowed:

"I'll show you gander! You better keep out of my way!"

The sun shone down, warm and kind. Piercing sweet was the fragrance of young grass and leaves. But it was a cold, gray world to Sergei. He was hurt, bitter. He walked along, thinking: "How to get back at that big bully, that though, sneaky gander?"

He built plan after plan of revenge, discarding them one after another. Attack his enemy in the dark, lasso and tie him to a tree with the help of his old friends from Pea Lane—ten strong right arms? No, Sergei did not like that idea much. The only thing left to do was find a magic potion so he would have the strength of ten men, then challenge the fellow to a fight. But where could he get hold of such a recipe?

Suddenly, strong hands caught hold of Sergei and swung him shoulder high.

"Here he is!" somebody cried with a deafening shout. "Let's toss him!"

Sergei came to with a jolt. He saw flags, fellows in bright sports jerseys and, like a blow in the eyes, big white letters on red bunting: FINISH! The strangers carrying him high over the heads of the crowd were yelling:

"Found him! The winner! The champion!"

The crowd turned, opened out, stared; while Sergei blinked his eyes and looked this way and that.

Somebody caught his wrist, held it walking alongside, and said in amazement:

"Pulse normal. Heart regular as a clock."

"Not even out of breath!" another joined in excitedly. "Breathing easy as a baby!"

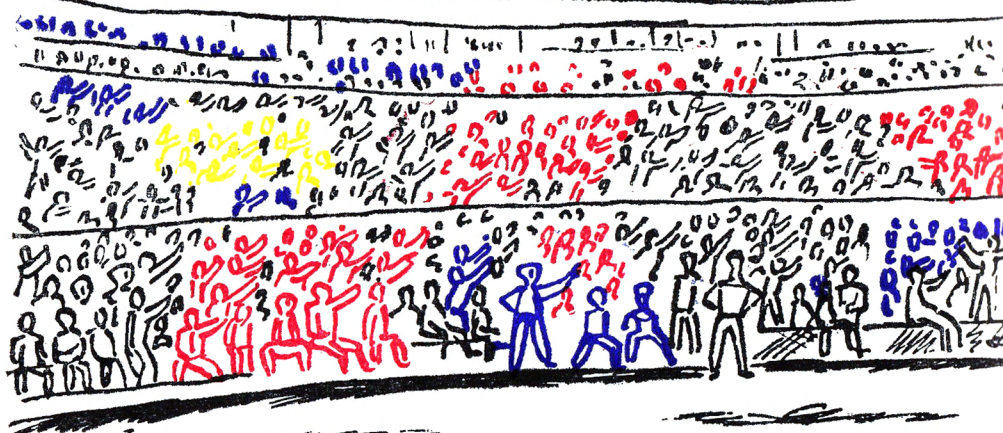
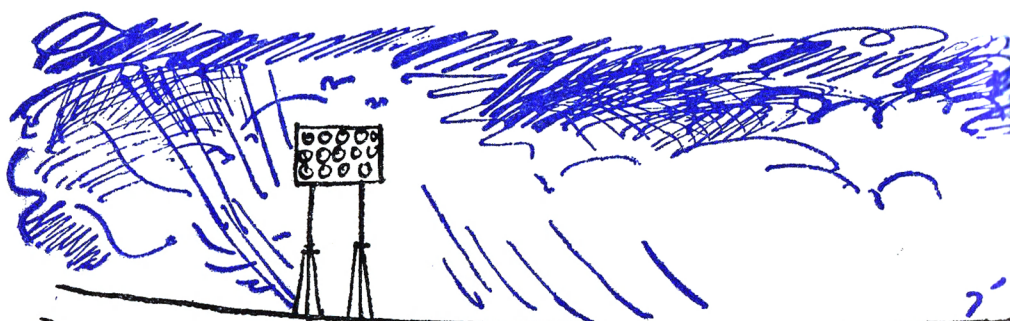
"The winner! The champion!" went up the cry all around.

Sergei was set on his feet in front of a tall, brawny man in a white suit with a red arm-band.

"What's your name, boy?"

"Sergei Cheesekov," said the amazed "champion".

"Where do you live? And what school?"





"Linden Avenue. Cybernetics Vocational."

"Comrades!" announced the judge, loudly. "The name of the unknown winner is Sergei Cheesekov. He lives right here in October District."

The crowd cheered.

"Good lad," the judge said to Sergei. "Congratulations!"

"It's nothing," Sergei shrugged his shoulders.

"Good lad," repeated the judge. "That's the right spirit. But tomorrow at five o'clock come to the stadium, Track and Field Section. Here!" He pulled out a paper pad, wrote something quickly and tore off the sheet. "Here's the address, and my name. Be sure to come. Have to bring out new talent, you know."

He turned to the second judge standing beside him.

"I think it's possible to count Cheesekov a contestant."

"But I must protest against it," came the sharp retort of the second judge, who was wearing a gym sweat-suit. "Cheesekov is not listed on the relay team."

"Then put him on it! Write him in!" cried the onlookers. "After all, he's from our district."

The judges began to argue, and Sergei began edging away, clutching the paper. Some of the fans patted him warmly on the back, some had a good word for him, somebody gave him an ice-cream. They all regarded him as a born wonder.

But the wonder was very uncomfortable. And bewildered he looked over the noisy crowd and picked out a fat man with a cane, to ask shyly:

“But what’s it all about?”

“Now just look at him!” cried the fat one loudly, to Sergei’s dismay. There was no way of retreat: he was surrounded by a tight ring of admirers. “He doesn’t even know what he’s done,” the fat man went on, banging the pavement with his cane. “Such talent, and not spoiled! Well now,” he turned back to Sergei. “We were losing the relay race, to the next district, you know. We thought it was all up. The last lap of the 400 metres: our runner stood waiting for the baton, but theirs was already off his mark and showing a clean pair of heels too. . . . And suddenly, out of nowhere, you turned up—grabbed the baton while our fellow just gaped, then caught up with the leader, passed him, broke tape and disappeared. What a stroke of luck you live in our district!” The man suddenly waved his cane and yelled: “Put Cheesekov on the list!”

“Put him down,” joined in the bystanders.

Sergei thrust the paper into his pocket, slipped out of the crowd and ran off at top speed. Nor did he know why he ran from the bright flags and noisy spectators, but he certainly did not want to go to the head judge and clear up the mistake. All the incidents of the morning—his decision to be a physicist, the searing sun in his eyes, his thirst for revenge, his unexpected fame—were mixed up in his head. All drove him on. Very likely he could have set a record, the way he was running now. Only his heart was thumping like a pendulum gone crazy, and a strange whistling came tearing out of his lungs.

He darted up a steep riverbank, flopped on the grass and lay still for a long time, eyes closed, listening to the heavy thud-thud



of his heart, gulping air. When his breath came back, he rolled over on his stomach and caught sight of a blue windbreaker in some nearby bushes. The windbreaker was ordinary enough. But just the same something about this one disturbed Sergei. Something small, black and shiny jutted out from under it. He stared hard and his eyes bulged: it was a small electric plug for a wall outlet.

Sergei had never before seen a windbreaker with such an unusual appendage. So he crept noiselessly towards the bushes, carefully picked up the plug and pulled it. The windbreaker twitched and began to move. Out of the bushes, straight at him, crawled a boy—a boy Sergei knew very well.

No, he did not know him at all! It was some stranger. But this “stranger” was the image of himself. Sergei stared at him, wide-eyed, and felt as though it was himself crawling this very moment out of the bushes amazed at the bully pulling his windbreaker. And the boy in this blue windbreaker, Sergei’s living double, was also struck motionless and stared right in Cheesekov’s eyes. But the stranger’s face was blank—not a smile, and no astonishment. Absolutely unruffled.

“Is this your plug?” said Sergei finally, snapping out of his stupor.

“Yes,” the boy answered, his voice rasping a little.

“But what’s it for?” Sergei questioned him again, and heard a strange reply.

“I run on electricity.”

“You. . .” Sergei hesitated. “You’re—a robot?”

“No, I’m Electronic,” the boy answered, as unruffled as ever.

“Then you’re not a human being?”

“No, I’m not a human being.”

They sat close beside each other on the grass. Sergei sneaked a glance at his neighbour. . . . “Well, what if he has an electric plug on a cord,” ran through his mind. “At least, with him, you can talk normally, like with a human being; which you can’t with the Gander.”

And suddenly a thought struck him.

"Listen, was it you who ran so fast you beat everybody in the relay race?" he asked excitedly.

"It was me."

"You know, we look very much alike. . . ."

"Such a coincidence only bears out the laws of mathematics," explained the boy in the blue windbreaker, and Sergei was at once reassured by this sober reasoning.

"That's it!" he cried suddenly. "That's why they took me for you. But the champion—it was you!"

"Maybe it was," agreed his companion. "But I didn't want to be anything of the kind."

"You didn't? You're a rum one!"

"My legs kept going in spite of me," continued the strange boy. "I couldn't stop. So I'm probably not a real champion."

Then Sergei jumped to his feet and began to relate how the judges argued, about being tossed and carried shoulder-high. The other boy also got up and followed Cheesekov's tale attentively. His face was as calm as ever, showing no emotion. No, he was not envious of Sergei's moment of glory, not the least envious.

"I guess nobody ever ran so fast!" cried Cheesekov in high delight. "If the judges were still there, I'd take you to them now, and say: 'Here's the fellow who set a new world record! But I'm nobody—just Cheesekov.'"

"Cheesekov?" rasped Electronic, questioningly.

"Oh yes! . . . I haven't introduced myself yet." Sergei put out his hand. "I'm Sergei Cheesekov."

"Sergei Cheesekov," Electronic repeated slowly, as if trying to memorize it. His right hand carefully took hold of Cheesekov's, and squeezed it so hard that Sergei screamed.

"Excuse me, Sergei," Electronic looked ruefully down at his hand. "I've been programmed to give a friend a very hearty handshake."

Sergei was hopping up and down, blowing on his fingers.

He was not a bit offended—on the contrary, as happy as a lark.

"It's nothing! Why, it's splendid even! You hang on to that, don't change. It'll come in real handy. . . . Well, all right, we won't talk about the Gander right now. Better if you tell me about yourself. Do you live here?"

"No, I just arrived today."

"Then I'll show you around town!" cried Sergei happily. "First we'll go to the park, and buy ice-cream, four apiece."

"I don't eat anything," said Electronic.

"Completely forgot," cried Sergei, spreading his hands in a gesture of helplessness, sorry for his friend with all his heart.

"That's rotten. Ice-cream's a lot better than electric current. I can swallow four strawberry ices at once."

"I can swallow things too. . . . When I do magic tricks," specified Electronic.

"Magic tricks? Say, that's fine. Be sure and do some for me!"

"All right. Glad to."

And so, chatting away happily, they headed for the park. And everybody they met stared after them: it was not every day you saw such identical twins.

## THE MAGICIAN OF ALL TIME

And here they were, going into the park. Today there was a carnival—and they passed a funny, rouged clown, a mad scientist, a Martian on stilts. They were given masks to wear too. A great gold star for Electronic and a grimacing bear's head for Sergei. Loudspeakers blared out a marching song. There was a model of a famous sputnik flying its circling orbit, and farther off tiny rockets shot up in the sky. Sergei and Electronic ran to have a ride on the Ferris Wheel, which rose up and down, turning

round and round. From on top they could see over the whole city, and Sergei pointed out all the sights of interest. They rode the merry-go-round, looped the loop in aeroplanes, took off and landed in mock space-ships. Always together—Sergei and Electronic. Side by side—Electronic and Sergei.

They joined the audience in front of an outdoor band-shell to see a concert. At the end of the stage stood a slender girl, dressed in blue from head to foot, holding blue balloons—the theme of her song:

*Balloons, balloons,  
My lovely blue balloons,  
Balloons, fly away  
And carry away  
My shining dreams on high,  
Far away, way up high,  
Where roof-tops reach the sky. . . .*

Listening, Sergei fell silent, his eyes on the girl in blue, Electronic forgotten. He even forgot to clap with the rest, as the girl left the stage.

The Master of Ceremonies appeared and made an announcement:

“This is Amateur Day, and we ask our audience to join us in giving the concert. The song you have just heard was composed by the singer, words and music. Don’t hold back now, boys and girls. The next number is by the Samovarov Brothers, acrobats.”

But Sergei paid no attention, and craned his neck to see where the girl in blue sat . . . in the front row. He had never been interested in girls before. Funny feeling!

“Electronic,” he whispered, “you go on. Do some of your magic tricks.”

“Oh, I don’t know. . .” began Electronic, uncertain.

“Be a good chap, Electronic. Show us what you can do! Everybody likes a magician act—they’ll all clap like mad.”

"All right," agreed Electronic, and followed his friend towards the wings. Sergei pulled the M.C. by the arm and explained, pointing to Electronic who still wore his mask.

"He's a friend of mine, and a splendid magician. Will you let him have a go?"

The M.C. nodded, pleased with the idea.

"And how shall I announce you?" he turned to Electronic.

"As 'The Greatest Magician of All Time—Past, Present and Future,'" said Electronic in his rasping voice.

And Sergei smiled proudly. "How did Electronic ever think up such a grand title? What an imagination. . . . Interesting to see if he lives up to it. . . ."

But the M.C. was thinking: "Oho! There's modesty for you." However he walked onto the stage and announced Electronic just as he had been told, thinking that if the "magician" were a flop the public would take it all as a big joke.

"Now, you show them!" Sergei encouraged Electronic, stealing a look at the girl in front. "You're the best runner in the world, and now you'll be the best magician. Give me your mask! Let them all see what you look like."

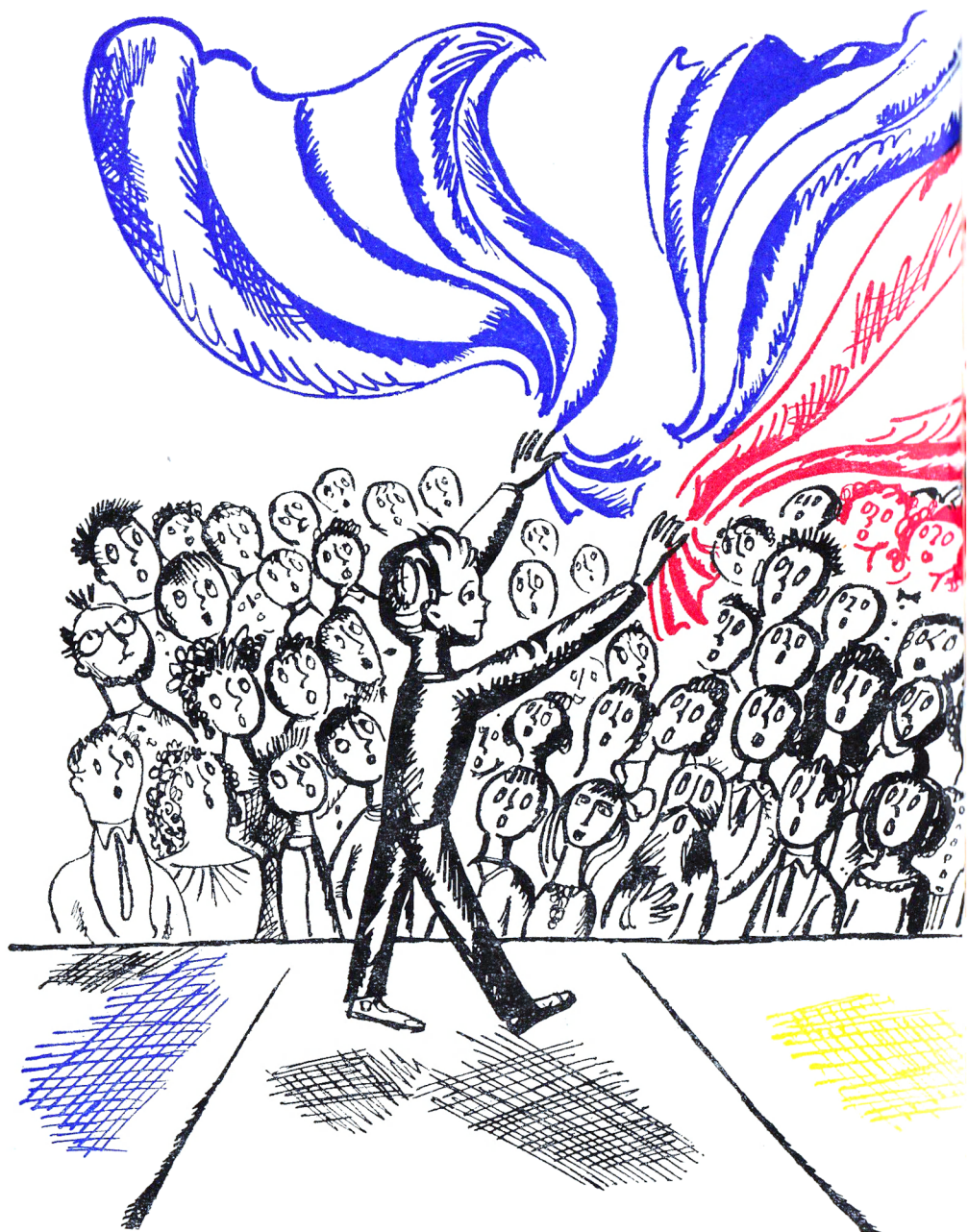
"Okay, I'll show them my whole act," Electronic repeated, quite cool, and gave Sergei his mask.

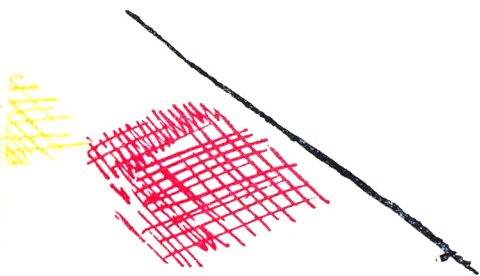
He went to the centre of the stage and raised his hand. The audience stared at him, and then noticed the electric piano slowly rolling away into the wings all by itself, on its small castors.

"Fraud!" cried a boy loudly from the front row. "Someone's pulling it by a rope!"

But the M.C. in the wings stared round-eyed, for nobody was pulling the piano. The magician lowered his hand, and the piano came to a standstill. And the girl in front waited what was coming with bated breath.

To everybody's surprise, the magician turned a somersault, and at the same moment onto the stage bounced many thin, silver hoops. They tinkled as they bounced along, and orchestra music





was heard. The hoops followed the motions of the magician's hand, forming circles, one, two, and then three—rolled apart and began twirling like circus horses. The magician stood with closed eyes, confident of his power.

The audience, and Sergei in his Bear Mask, clapped so hard you could not hear the music. Sergei was wild with excitement. What a magician! Good for Electronic!

"It's as clear as day," called out the boy know-it-all in the front row. "He has an electro-magnet in his hand. It repels and attracts them. That's not magic. There's no such thing, anyway!"

Magic or not, the rings rolled all together, the magician turned his back, and the rings were gone. Only the M.C. saw them leap and disappear under the magician's sleeve.

Now Electronic took out a cigarette and asked somebody from the audience to come and give him a light. Then he blew out a cloud of smoke. Fluffy rings floated towards the audience.

"He's smoking, the rascal!" cried a woman in the audience.

"It's only by way of a joke—only one of his tricks!" a seatmate said.

Puzzled, Sergei watched the cigarette, and a moment later a rainbow of coloured kerchiefs parachuted down among the onlookers from the smoke-rings—red, blue, yellow, green. . . . Everybody jumped up, clapping and laughing, reaching for the silk kerchiefs.

Then the audience grew quiet as the magician bowed, and said in his rasping voice:

"Now, if you please, bring me some article you have on you—watches, pens, etc."

One boy started collecting these in his hat—fountain pens, watches, combs, change purses and so on. The hat was taken to the magician, and he began to swallow the different things, one at a time.

"Hup!" he cried, swallowing a wrist-watch. "Hup!" and down went a pen. Everything was swallowed as if it were a ripe cherry or plum. The pens and combs went down with a whistling gurgle.

The audience sat absolutely still—in tense silence. The M.C. paled for some reason. . . .

"That's all," announced the magician quietly, bowed, and walked towards the wings.

There was scattered applause, and then an uproar:

"Hold on there! Give us back our things! Hey!"

The onlookers were on their feet; but the magician leaped from the stage and ran, Sergei at his heels. The audience broke up and tore after them. Apparently the electric overcharge Electronic had received was again impelling him on, and he could not stop. The audience could not catch him, nor did they get Sergei either.

The M.C. looked on in confusion. The magician's friend in the Bear Mask had disappeared, and the Star Mask lay forgotten on one of the seats.

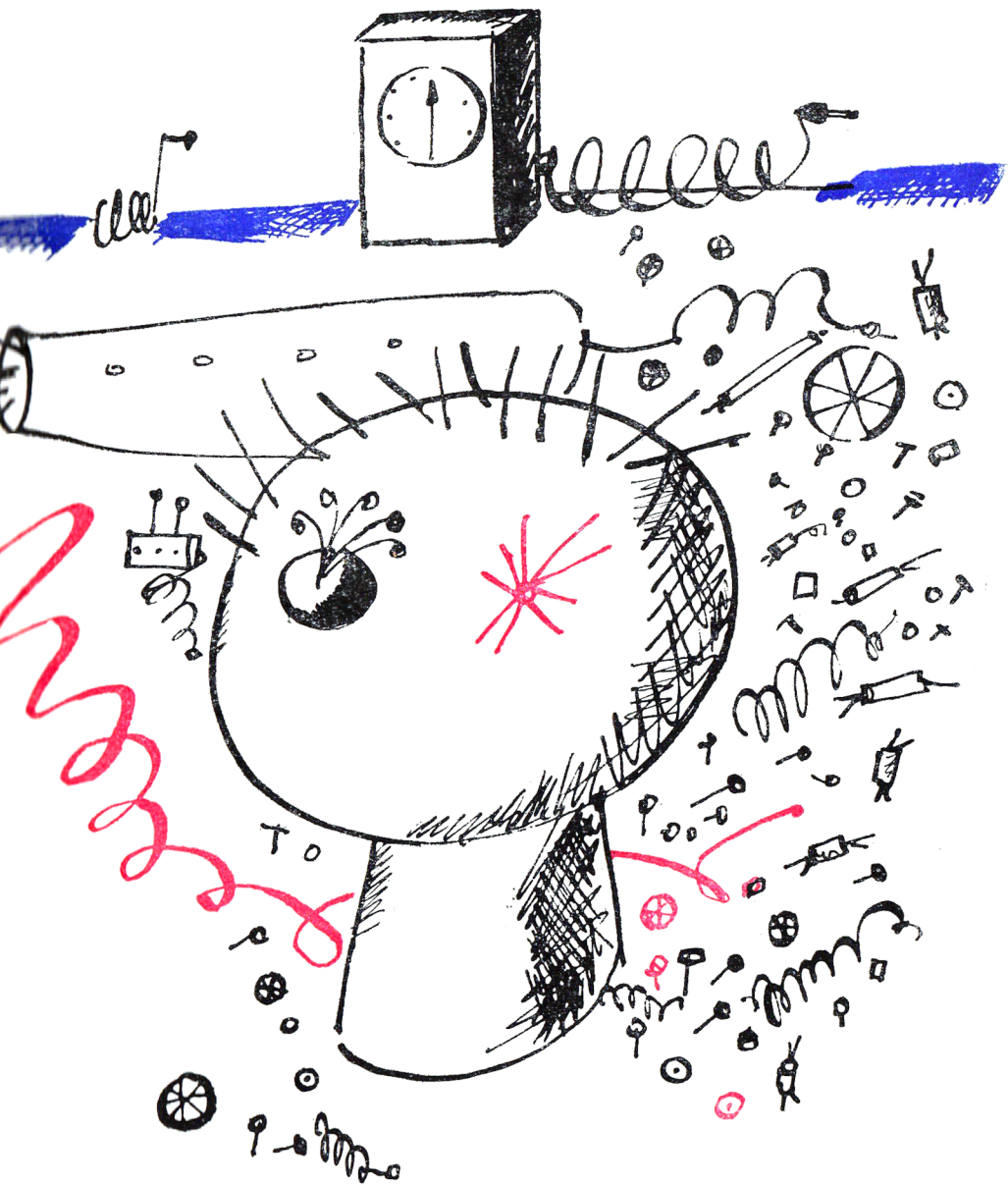


“I said he was a fake!” cried the boy who had kept interrupting. “We know these magicians! You didn’t catch him?” he asked as the audience straggled back. “Ha! Ha! Hocus-pocus!”

But the girl in blue stood still throughout the turmoil, staring with wonder at the red, transparent kerchief she held. It bore the picture of a laughing face with turned-up nose—and a mysterious word: ELECTRONIC.

# All About Electronic







## THE CUNNING Y, THE DOG'S HEAD AND OTHER RELATIVES OF ELECTRONIC

Alexander Sergeyevich Svetlovidov, cybernetics scientist, was sitting in the hotel lobby, waiting for the professor. From the confused explanations of servants and manager, he could not make out what had happened here in the half hour it took him to get to "The Oaks" from the institute. The portmanteau which four men had barely managed to bring up stood empty. Where had the contents got to?

On the telephone, Svetlovidov remembered, the professor had promised him a surprise. A funny kind of surprise that could disappear from a room the first floor up without going out the door!

He went outside several times and paced up and down in front of the main entrance. Finally he ended up in the professor's rooms, and settled down in a chair to wait. Once, however, he jumped up and approached the mirror to examine, disgruntled, the knot in his tie. And began a thorough going-over.

"Well," he addressed himself with some irony, "to look at your baby face, who would take you for a graduating Doctor of Science? It's no good, Svetlovidov. Nothing can make you look like a solid, respectable scientist—not your best suit or the way you part your hair, not even your perfect little moustache! Eugene Gromov can see nothing but science, and pays no attention to your age. But if he only knew how few really original ideas come out of your head. . . . If only the efficiency factor of that same head were equal to one per cent of the professor's! . . . Getting envious, are you? Enough jawing!" the critic pulled himself up. "Better sit down and try to guess what these strange goings-on mean, and when the professor will be back."

Svetlovidov really liked, even worshipped, Professor Gromov. You always came away from him feeling good, and stocked up with the best of ideas too. Long after, you would remember the gangling professor's kindly, boyish laugh, the sad-gay look in his eyes—and, of course, the thick smoke clouding out his pipe.

Cyberneticists and physiologists often argued over Gromov, each claiming he really belonged to their science. But their disagreement did not matter. Gromov gave himself readily to either—after all, the two branches of science were not so far apart. The professor's articles and speeches on the brain had solved several knotty problems as to man's thinking processes: physiologists and psychiatrists both used his many hypotheses. And the cyberneticists used his ideas in original computer design.

Everybody knew that Gromov had a passion for making electronic toys in his spare time. He had designed a talking parrot, a singing dog's head, and a monkey-magician. Some considered them simply amusements; but others said the toys had very interesting sound-circuits, motor centres, and speech programming units, which would come in useful for future robots destined to astonish mankind.

Svetlovidov's mind wandered to the time ten years ago when, still a young engineer, he had had to go to the Siberian Scientific Research Centre at Sinegorsk. While carrying out his assignment, he continually dreamt of meeting the celebrated Gromov. Finally, he telephoned the professor, and got an invitation. . . .

. . . Svetlovidov walked from his hotel in Sinegorsk to the Computer Centre. The streets were deserted, wet from the fine steady drizzle. Not far from the Centre's buildings, he saw someone walking along who was acting rather strangely. Rain-coat flying, hatless, regardless of the rain, this person circled a lamp-post and scribbled something quickly on a scrap of paper. Svetlovidov recognised Gromov.

"You've come just when I need you most," said the professor, taking him by the arm. "Come along!"

"But you'll catch cold, Professor!" exclaimed Svetlovidov. "It's raining, and you without a hat!"

"That's all right," Gromov smiled gently. "I came out to meet you, and got interested in something. And when the head is hot, you know, it doesn't hurt to cool it a little."

They entered a small room cluttered with tables and appliances; the professor wasted no time in explaining what he had in mind. It was an experiment that reminded Svetlovidov of an absorbing game. As the professor told him, two other participants were in the next room, call them objects *X* and *Y*. One was Gromov's elderly assistant, Pumponov. The other was—an electronic computer.

The professor sat Svetlovidov down before a table holding two teletype machines. Over one was the letter *X*, over the other the letter *Y*: each of the unseen players in this game used his own machine. The rules were very simple—the guest could ask *X* or *Y* any question he wished, and after half an hour had to guess from the answers which player was the man, and which the computer.

... Even now, Svetlovidov remembered the questions he gave *X* and *Y*, and their answers. . . .

To begin with, he asked how old they were.

*X* telegraphed: 800 years.

But *Y*'s answer was less imaginative: 50 years.

Then Svetlovidov delivered another two probing questions:

"How long have you known the professor? What do you think of him?"

*X* tapped out on the telegraph tape: 350 years. I'm rather afraid of him.

*Y* answered differently: All my life. I worship him.

Sitting at the teletype keys, it had been easy enough for Svetlovidov to imagine the tactics of the unseen players: "A man cannot calculate like a machine, his slower answers would immediately give him away. It follows that the machine, to deceive, has to be cunning in pretending to be the man-player. But the man (Pumponov) has no other choice but to tell the truth." As it turned out later, this system of logic was the right one. But all the same, *X* and *Y* got Svetlovidov into a muddle.

From the first answers, he thought: "*X* is 800 years old. Preposterous! More than likely, that's the machine." But it was too

early to jump to conclusions. And Svetlovidov decided to test his opponents in arithmetic.

“Add 928,714 and 47,218.”

*X* thought 30 seconds and telegraphed: 975,932.

Svetlovidov to *Y*:

“Give the sum of 723,022 and 252,910.”

After half a minute, *Y* telegraphed: 975,932.

“Ouch,” said the young engineer to himself “both of them took only half a minute. Somebody’s being tricky!” And he fired a string of questions at *Y*:

“Recite the opening lines of the first chapter of *Eugene Onegin* by Pushkin.”

“My uncle lives by honest maxims . . .” replied *Y* swiftly.

“Don’t you think it would ring more true,” asked Svetlovidov, “this way: ‘My uncle is a man of honour’?”

“That would break the rhyme and spoil the poem,” observed *Y*, with unbeatable logic.

“But if you put it like this: ‘My uncle lives by sordid maxims’? As you remember, Onegin’s uncle wasn’t exactly his ideal. And the rhyme in this case would be correct.”

*Y*’s answer was crushing: “Why be so unkind to his uncle? I trust you’re not serious?”

Wiping the sweat from his brow, Svetlovidov decided to go after *X*. He could not quite figure out which player *Y* was. Could a machine be so clever? Of course it could, seeing it was programmed by the professor. As for the assistant, Pumphonov, Svetlovidov had no idea as to his character or type of mind.

. . . So now it was *X*’s turn. Would he manage to guess who or what *X* was?

“Do you play chess?” he asked.

“Yes,” *X* replied shortly.

Svetlovidov asked him to solve the following problem:

“Black’s King is on K1 and I have nothing else. But White’s King and Rook are on K6 and KR1 respectively. How would you move?”



After 30 seconds of silence, *X* tapped out the solution on the teletype tape:

"Rook moves to R8. Checkmate!"

It seemed Gromov's guest was losing the game.... Twenty minutes had already been used up. Gromov smoked his pipe and glanced slyly at his young colleague.

"What question should I ask?" Svetlovidov wondered, unhappily. He asked the very simplest he could think of.

"What do you like more than anything else?"

The answers were candid and apparently without guile.

*X*: "The pictures."

*Y*: "I like sweets."

"Which one's trying to fool me?" thought Svetlovidov, exasperated. "Can a computer go to the cinema? No. And what about sweets? Am I turning into an idiot, or what? Just the same, I've got to keep cool. Must think it out, bit by bit."

"What movies did you see last?" he asked *X*.

"Foreign ones. 'Death for Two Cents,' 'The Penalty,' and 'Source of Power.'"

The titles were unfamiliar to the Muscovite. He asked for more details.

"Tell me about the first one."

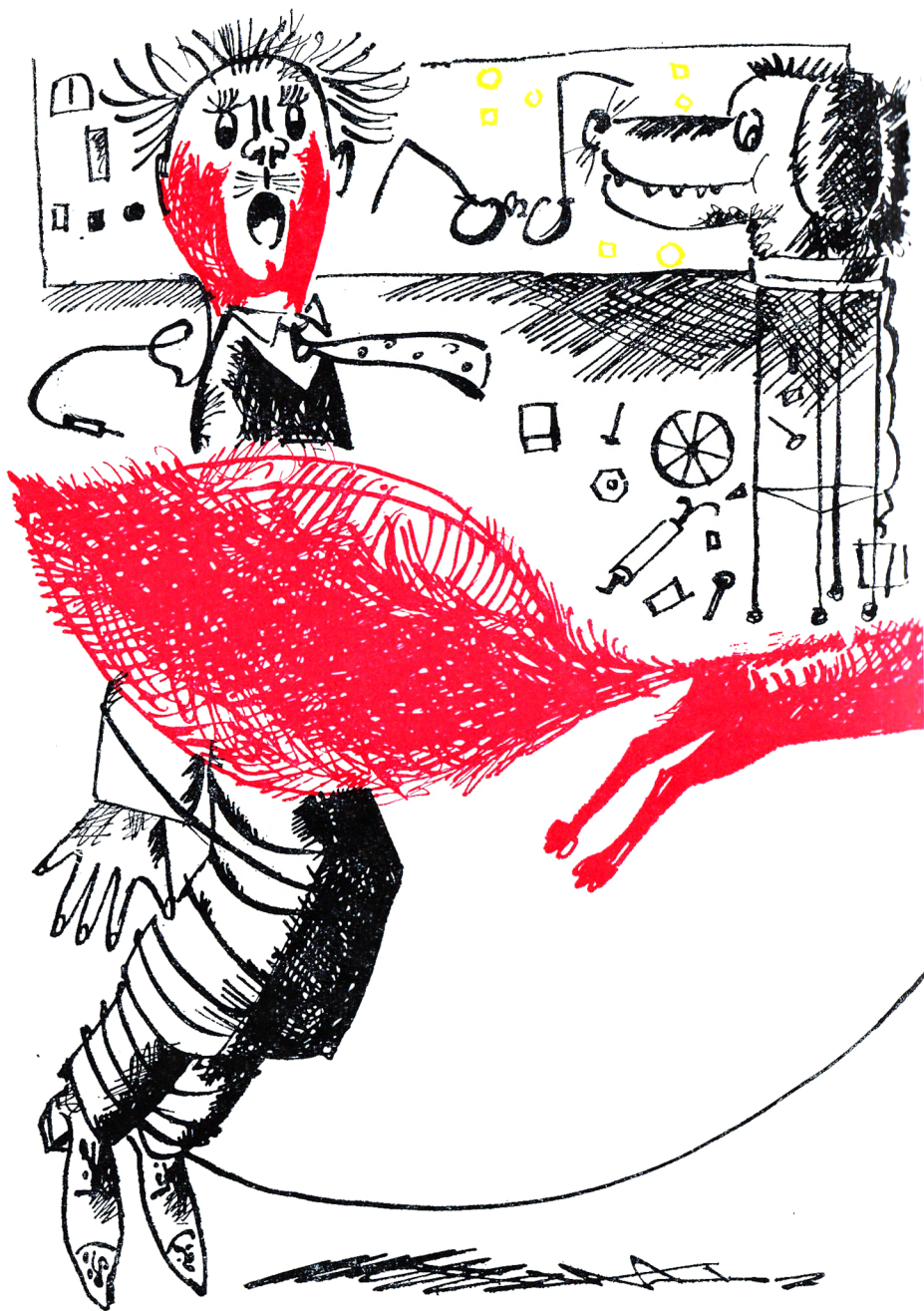
*X* began: "A girl and a young worker fall in love. But they meet up with some crooks who want to spoil their future. One crook, nicknamed Caro, is still kind of human, but the rest are out-and-out scoundrels. They want to drag the young fellow into some shady deal or other. Suddenly, shots ring out: one, two, three.... I counted two hundred and seventeen shots...."

Svetlovidov found it SO FASCINATING that he interrupted *X* in the middle of the story, and telegraphed:

"Enough!"

Leaning back in his chair, he said in a tired voice: "That's a man."

"See, you've guessed it!" cried Gromov, frankly pleased. "In the beginning you had the right idea, I noticed—the machine lied,





and the man told the truth. But now I must introduce you to my assistant, and you will understand why he made a fool of you once or twice."

...Svetlovidov called to mind the lively old man with the slight, stooped figure. His face was creased with wrinkles, which continually ran together into a knowing smile, while his eyes became two small green pinpoints. Pumponov had not played the game with craft, but answered all questions accurately and quite sincerely under the pseudonym of X. He was very old, and in all innocence of heart asserted that he had lived for 800 years, and for 350 had worked for the professor. "What can I do?" he had told Svetlovidov. "That's how much I make it. But you'll have to forgive an old man for giving you a bad time." Pumponov really was excellent at chess and liked the cinema better than anything else. His craze for them had given him away.

As for the computer—the crafty Y—it had in fact been cunning enough to slow down its answer to the arithmetic question, in an attempt to confuse the questioner.

The experiment had tickled the professor more than anybody. Remembering the puzzling answers of *X* and *Y*, he had burst into infectious laughter and then imitated all three players in turn. In any case, he had been very adroit in programming the computer to be so cunning!

It had been a very special evening. They drank strong tea in Gromov's study, while their host went over his young years when he had been a lover of the sea. He had been a sailor on a merchant ship, and voyaged around the world. And Svetlovidov had talked about his carefree student days. Memories. . . .

After tea, Pumponov led their guest to his workshop to listen to a few request songs from the Singing Dog's Head. It sang, opening its mouth with studious care and rolling its shining glass eyes. A rewarding concert: all the songs were composed by its electric brain on the spot.

Then the old assistant started the toys going, on the floor. Turtles, two foxes and a monkey ambled round the room, responding to Pumponov as if they were alive and performing before an audience. Only the long cord connecting them to an electric control box made you realise they were not real.

There was a very sad story connected with this. It happened one day when Pumponov was programming them, alone. He gave commands by microphone and was so carried away he forgot about the cord, not noticing his legs getting tangled in it. When he did, and wanted to stop the fox he was working on, he forgot the proper word of command. He cried out: "Enough! That will do! Stand still!" But the fox paid no attention, and continued to run round Pumponov till he was tied up so tight he could not move. If he had cried out the simple word: "Stop"—the fox would have stopped dead. He had been programmed to this command and knew no other. The old fellow cried and prayed, trying hopelessly to reach the control switch to turn it off. . . . When Gromov glanced in, he found his assistant lying on the floor unconscious, bound up tight with the cord. The professor had difficulty bringing the old man round; but the moment he opened his eyes, he said:

"He doesn't seem to know anything. . . . I've worked for you 350 years and never saw such a fool fox before!"

"Be more careful in future," said Gromov ironically. "If you go on this way, you'll either make a new scientific discovery . . . or end up dead."

Svetlovidov was so absorbed in remembering, he did not notice the professor enter. But the familiar voice brought him out of his chair.

"Excuse me for keeping you waiting," said Gromov.

"At last!" cried Svetlovidov, happily. "For you, I'd be glad to wait a lifetime. But what happened?"

## HOW ELECTRONIC WAS BORN

"I'm afraid there won't be any surprise," Gromov announced, apologetically. "The surprise, my dear Alexander Sergeyevich, simply did a bunk."

"What d'you mean—did a bunk!" exclaimed Svetlovidov, astonished.

"Simple! Jumped out the window—and that was the last I saw of it!"

It was only now that Svetlovidov noticed the professor's appearance: tie skew-gee, hands dirty.

"Well, let's not worry about it right now," he said cheerfully. "To begin with, you'd better wash and clean up."

The professor complied, taking off his jacket and tie, and heading for the bathroom.

Svetlovidov could hardly wait to find out who, after all, HAD jumped out of the window. But it was no use upsetting the professor more.

"What about having breakfast?" he suggested.

"While I was chasing after that surprise," Gromov shouted from the bathroom, "I got very hungry and dropped into a coffee shop.

By the way, the cook there used to work on a ship. But I must apologise again for keeping you waiting, the cook and I got to yarn-ing, you know. . . . Now," continued the professor, coming into the sitting-room, "I'm ready to clear up this little secret."

He took a yellow suede jacket from his travelling bag, put it on, and settled down in a chair with a sigh of relief. Then he recounted adventures of the morning. Svetlovidov listened, laughing and frowning, walking round the room, only half-believing. An electronic computer that was just like a real, live boy—this really would have been a surprise for the Cybernetics Conference. As a scientist, Svetlovidov understood how much work, how many new ideas had gone into this unusual invention, and he was impatient for the details. But something else had to be done first.

"I'll call the militia station," he suggested, "and ask them to look for him."

"But what will you say? I shouldn't like to have the secret get out till the Conference opens," said Gromov. "All because I'm absent-minded! I clean forgot about the difference in voltage, you know. And this is the terrible result. As you've probably guessed, Electronic's muscles got a signal of urgency, alarm, due to a double charge of electricity; this drove him to move at very high speed. And what if he bumps into somebody, or starts a fight? He could easily wring the neck of the average man!"

"Let's hope he was brought up better than that," joked Svetlovidov.

He got the militia station on the video-phone and, giving his name, asked them to make an immediate search for a thirteen-year-old boy by the name of Electronic. He gave a description, mentioning that the boy could run very fast, and asked them to call him as soon as they had any news. He did not give any other particulars about Electronic.

"Excuse my curiosity," he said, turning to Gromov, "but I can't wait to hear the whole story from the beginning. I suppose we have time."

"As long as you let me smoke as much as I want. I'm not able to talk long, unless my pipe's going."

The professor took his time lighting his pipe. At first his eyes were sad; and then they began to dance with light. Gromov ruffled up his thick, gray hair and began to puff contentedly.

"It was this way," he began. "I have a very old friend; his name's Nikolai, he's an excellent surgeon. Every time we met we got into endless arguments. Just imagine if you had to talk with a man who considered the brain the very perfection of Nature. . . . You smile. But you should have seen how pompous he would get . . . going on about the complexity of man's organism, the perfection of the brain, and such like. I began my smiling, too. But then I got angry. Finally I reminded him that man, on the average, usually uses only a small part of his mental resources. Indeed, there are several subjects the odd schoolboy or student finds it difficult to digest. And you see, school or institute curricula are only crumbs, which the average person should be able to absorb. If he used only half his brain power, he could learn forty languages as easy as wink, and graduate from dozens of universities; he could memorize the whole of the Great Soviet Encyclopaedia quite easily.

"Nikolai was obstinate, though. He put up an argument: 'Even if what you say is true about the limitations of the average mind, a genius can do anything and everything.'

"'But wouldn't he pay for his genius by working terribly hard?' I reminded him. 'A genius breaks down the barriers erected by Nature. He provides us with a great amount of new knowledge. Remember when they asked Einstein how long his working day was, he thought they were joking? A scientist's working day has no beginning and no end. And now that scientists are literally snowed under with an avalanche of accumulated knowledge and new discoveries, their position has become especially difficult. The size and complexity of the problems, with which industry alone confronts science, grow year by year. I know of a case where one mathematician devoted thirty years of intensive research just to

solve a single problem. But how many interesting inquiries are temporarily shelved because a whole lifetime is too short to carry them out! And so, man realised his limitations a long time ago, and centred his energy on creating something which could relieve him of unnecessary labour and make it easy for him to assimilate the endless stream of information—new knowledge.'

"At this point, Nikolai thought he had the right to be sarcastic: 'Are you, by any chance, speaking of computers?'

"'Naturally,' I assured him.

"'You know, I feel sorry for you,' he said. 'You spend months teaching a machine how to solve a simple problem in geometry. Or, as you put it, you programme it. Whereas I, a person comparatively ignorant where maths are concerned, could solve it in half an hour. Excuse me for asking, but what things could this machine teach me?'

"Nikolai was right. It is always more complicated to teach a machine than a person. And I didn't hide from him how difficult it was. However, I reminded my conceited friend as to how he was able to solve a simple problem. He, of course, imagined that in the half hour it took him to solve the problem, he used and selected a definite quantity of information, based on his personal knowledge he had been programmed with during his school years.

"And Nikolai nodded: 'Yes, that's right.'

"But was that really all? Nikolai simply did not realise that when he took up his pencil, he was armed not only with school lessons, formulas and rules he had learned, but with a whole lifetime of learning. In childhood, at first he crawled, then walked, ran, skinned his nose and his knees and so got acquainted with the dimensions of space around him. At school he mastered the use of tools, made models, planed and sawed. He studied Advanced Geometry and awoke to the fact that the earth was a sphere. Finally he was connected to all the earth by invisible strings: billions of sensations—physical, chemical, magnetic, electrical—wound up into a complex ball of mental activity. This is all information which the surface consciousness is not aware of, but which every



adult has at his disposal. People like Nikolai never think about this, and regard their success as a matter of course. But if you put this information into a computer, adding a bit more knowledge, it would prove as wise as my friend, if not wiser. . . .”

Gromov smiled to himself, his opponent beaten, and his attitude changed.

“However, I was a fool to attack my friend. These arguments were very useful, they threw into relief the difficulties of my task, aroused much needed doubts. I didn’t at all feel like some almighty creator in competition with Nature. I was simply turning over in my mind computer systems which would retain as much information as possible, and act upon it. . . .”

Gromov’s pipe had gone out long ago. Knocking out the ashes, he began to fill it up again. He closed his eyes for a moment, as if he were visualising this unusual computer which would take the form of a human being—a boy.

Svetlovidov broke the short silence.

“Excuse me, Eugene Ivanovich . . . I completely forgot. Will Electronic understand the militiamen, when they find him?”

Gromov roused himself.

“Of course. Of course! He can hear, and speak and understand everything. . . .” And Gromov went on to tell how Electronic came into the world.

His “parents” weren’t so perfect as their offspring. Compared with him, they simply looked like frightful monsters—cabinet-shaped units crackling with static and eating up a dreadful amount of electricity. But these parents—ordinary, old-fashioned electronic computers—were kept hard at it working out and checking the complex systems Gromov thought up. The two computers worked day and night, and the professor jokingly called them Electronic’s parents.

The going was easier, of course, because several mechanisms and devices had already been tried out in the experimental toys and other electronic machines—which could read books, tell ob-

jects apart, understand human speech and build sentences of their own. All the same, to make a computer-boy demanded fantastic effort and terrific resourcefulness on Gromov's part. In working out the design, he used all he knew about the human brain and the nervous system.

Naturally, the professor was not the only one working on Electronic. Alone, he could not have managed. His assistants, his friends, and students—twelve in all—devoted themselves to this dream of creating an artificial being. They spent five years on it, working in their spare time.

By then they had created a rather strange model. The shape of the hard, one-piece body looked something like the head and torso of a human being. As for its construction, you might describe it as a layer-cake. The computer was largely made up of compressed film, bearing complex electronic circuits. This film was a thousand times thinner than a human hair, and the size of the tiny components might have been the envy of any watchmaker. Electric impulses, flashing through the circuits, involved components as minute as the molecules and atoms of crystals. Therefore, this molecular-electronic design was amazingly compact in construction: each cubic centimetre contained two million components. Incidentally, there is about the same number of nerve cells per cubic centimetre in the human brain—the most perfect mechanism in the world.

But this was still not all that set Electronic apart from his parents. Usually, in electronic computers the elements are joined together in a successive chain; however quickly the computer works, the impulses run one after another through all the memory cells as they look for the answer to a question. This may be likened to an army, numbering a million, sending into battle two soldiers at a time while the rest stand by doing nothing. Electronic's memory was made up of cell-units so minute they could be seen only through a microscope. Like man's nerve cells, these cell-units were joined together by groups of fibre-like conductors through which the impulses flashed: so that Electronic reacted

quicker than any other computer. As he was fed information, a direct search for the answer to the problem started in several directions at once, along multiple conductors. You might say his whole army of knowledge was always in battle.

"We were so happy contemplating this artificial human, that for a second we forgot how much painstaking work and tormenting mental strain he had cost us," recalled the professor, smiling. "We began to call him our 'Dear Ugly Duckling' and were as amazed as children because he was so perfect. I remember walking around this future 'human being' singing the words of Hamlet: 'There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy'."

Afterwards, Gromov had turned the rest of the work over to his two closest friends—Loginov, a chemist, and Smekhov, a puppet-maker. Loginov had been working on synthetic muscles for a long time and had discovered the secret of making them contract. He had already invented a material which was much like the human skin. What Loginov did to the human-computer seemed like a real miracle to the cyberneticists, who knew little about chemistry. They were as stunned as children at a circus when the magician covers a ball with a handkerchief, takes it off, and they see a baby chick. They cannot understand it. First a wooden ball, then a live baby chick, if you please!... Electronic's designers called Loginov a magician—he gave the robot-computer arms and legs which seemed to be alive.

And Smekhov performed another miracle. His puppets had travelled all over the world with Marionette Shows, and were famous for their perfect imitation of human feelings. But each played one and the same role and never acted independently. You can imagine how happy this master puppet-maker was when he found out he would be making a real live puppet! Smekhov was terribly excited, and went about asking everybody what they thought the boy should look like. He was given such a lot of advice that he ended up more confused than ever. But one day Smekhov came across a boy's photograph in a magazine—the boy was

climbing out of a swimming pool, laughing in sheer delight. His fetching smile, turned-up nose, tousled hair—the whole appearance of the youngster he had chanced upon—so delighted the puppet-maker that he decided his new creation would be just like it. Smekhov pulled the synthetic skin over the machine, like you pull a stocking on, and locked himself up in his workshop. He let nobody in, right up to the day he brought out what seemed to be an honest-to-goodness real boy.

Nothing was left to do but find a name. Pumponov claimed it was his right, as the oldest, and said:

"It must be something modern but traditional too, like ancient Greek maybe." They all thought and made suggestions. Suddenly somebody said: "Electronic." A real find! And it paid tribute to Electronic's parents. In ancient Greek the word meant amber. So the question was settled.

Electronic-Amber shone like a toy in a shop window. The professor walked on tiptoe around his new creation, never dreaming what worries lay ahead.

## **TEACHING ELECTRONIC**

Gromov's story was interrupted by a gentle buzz. The TV wall-screen lit up, and both men rushed over to the video-phone. They saw the duty sergeant in the militia station.

"Your Electronic has been up to high jinks in the Recreation Park," said the sergeant severely, though his eyes held a gleam of amusement. "He did put on a magic act on the open-air stage, and swallowed dozens of watches, change purses and fountain pens. Here are the statements of his victims."

"My God!" exclaimed the professor. "I knew it. . . . I knew that idea of Pumponov's about making him a magician would give us no end of trouble."

"Has the boy been found?" asked Svetlovidov impatiently.

"The boy disappeared after jumping a fence six feet high. Here

is material evidence he left behind him." The sergeant held up to the screen a delicate kerchief bearing the imprint of a boy's smiling face, and the word: ELECTRONIC.

"I've sent out instructions to all stations," continued the sergeant, "to detain the boy and send him quickly to the hospital. Personally, I simply don't understand how he could swallow all those things."

"Please call us the minute you get any news," said Svetlovidov, "and thanks."

The professor nervously paced the room, hands clasped behind his back.

"The devil alone knows . . ." he muttered, not to anyone in particular. "That fool-minded Pumponov always lands me in a stupid mess. Instead of serious work, we end up clowning! What a rattlebrain!"

Surprisingly, Svetlovidov found it all very amusing. He would have liked nothing better than to see Electronic now, doing his magic tricks.

"But wasn't it a bit fool-minded to make a boy-robot who can run away from his teacher?" he joked.

"Now, really . . ." Gromov burst out, with some heat. "You haven't heard half the story yet, and already you're jumping to conclusions!"

"Don't get excited. I was only joking," laughed Svetlovidov. "I don't doubt that all the things he swallowed can be returned to their rightful owners."

"Of course, of course. There's a small box; it's easy to open."

"I'm sure he'll soon be found," said Svetlovidov. "You know, all this has wet my curiosity more than ever. Come on, Eugene Ivanovich, light your pipe and carry on. If anyone but you told me such a story, I'd think it was only a big joke."

"Then, to make sure you don't look on me as some kind of quack," smiled the professor, "I'll have to finish it."

He sat down in the chair opposite Svetlovidov and lit his pipe. As the match was struck, the younger scientist noticed the playful

glint come into the professor's eyes again. Apparently Gromov had recovered his good humour.

"In the beginning," the professor took up his story, "we found out our Electronic was an all-round fool. Yes indeed, he knew absolutely nothing. We had checked his reading mechanism earlier and found out he was able to recognise different images or signs, tell them apart. Pumponov programmed Electronic's sound-system, which was already able to catch the variations in human speech. My assistant would squeal, whistle, speak in a deep bass voice, imitate a child or a woman, and finally taught the machine to respond to the different voices. Electronic's memory was able to classify spoken words, and in time was expected to learn to form its own conclusions. In short, we provided it with all devices that might help it select and assimilate useful information. But for the present, he was just a plain fool. He knew nothing. . . .

"I'm being a bit too critical though," the professor pulled himself up sharply. "The memory of any child is like a schoolboy's exercise-book, clean paper, on which useful information must be written. But if you keep in mind that a small child asks his parents about five hundred questions a day, it is clear how he fills up this clean paper. . . . We decided to borrow Nature's simple method of gaining knowledge. But it was not so easy as we at first thought—actually we were swamped by an avalanche of work. In ordinary life we simply do not realise what an amount of things and ideas are all around us. And you see, all of these had to be made visual to Electronic, and explained as well. . . ."

Svetlovidov knew what a hard job it was, to teach a machine to think independently, and to act by itself. Listening to the professor, his lively imagination drew the whole picture of Electronic's school life. Lesson one: how to recognise and tell apart different things shown him. What is letter "A"? A complete little world. How could you explain to a machine that the letter "A" is two sticks that meet on top and have a third stick across the middle; and that an oval with a stem on the right side is also letter

“a”. So each letter of the alphabet must be written 100 times in different ways—in print and in handwriting. Later on, the scientist would show Electronic 20 different forms of the letter “A” and each time explain: “This is an ‘A’.” But the rest of the 100 forms, 80 of them, Electronic had to pick out for himself from the thousands of alphabet letters in front of him.

Like any schoolboy, Electronic got bad marks. Nobody blamed him for mistakes of course. But each time he made a mistake, the professor would push a button that delivered a punishment signal, and the transmission which sent out incorrect information would be weakened. The next time, the message would follow the proper channel, and the mistake would not be repeated.

“After the alphabet and numbers,” continued Gromov, “came pictures: men, children, women, animals, motor-cars, household furniture and appliances, everything in a school. Thousands upon thousands of things that a schoolboy has to memorize. This didn’t mean that his memory grasped the exact, almost photographic, image of a definite house or motor-car. If it was like that, Electronic wouldn’t know any other house or car but the one in the picture. Instead he memorised certain general, essential outlines of different images, and could tell a child from a man, and so on. The human memory acts approximately the same way. We never remember with photographic exactness, in every detail—not even our best friend—for our brain does not overload itself. None the less we never confuse a friend with somebody else, but recognise him even if we haven’t seen him for years.

“I haven’t tired you out, have I?” asked Gromov.

“Quite the reverse,” answered Svetlovidov. “I’m only afraid the militia station might phone us back too quick, before you finish.”

“Well, so far as I could judge from their last report, the heavy overcharging of Electronic’s batteries hasn’t run down yet. The militia will be kept on the run chasing him. But to get back to my story, I’ll go on to Electronic’s third lesson—reading. Doubtless you can imagine how much ground this covers. Take, for example,

the linguistics involved—phrases, classifying words into groups, the dividing lines between these groups, explaining the different meanings of one and the same word, learning vocabulary, idiomatic phrases, and so on. The methods Electronic used, to make sense out of a text, would astonish linguists. But facts are facts: Electronic learned to read so quickly I was amazed, and he read one book after another. I hardly found time to pick out new ones for him.

“To be fair, I have to admit that Electronic turned out to be very bright. I soon stopped using the punishment signal for mistakes, and simply explained them. This, naturally, called for more patience than just pushing a button. Certainly his success would have inspired any teacher. He enjoyed digging into theorems, calculated like lightning, and even found memorising poetry fairly easy. We could already hold discussions on various topics, Electronic usually expressing two opinions—one representing that of well-known authorities, but the other his own.

“Then there was the first time he walked around the room in the workshop—like a baby taking his first steps. We had prepared Electronic for this by putting on tape a graph of the natural electric current in human muscles, and applying it to his memory cells. This device is not new. As everyone knows, the electric impulses controlling the muscles of one person may be transferred artificially to the muscles of another—so that the second repeats the action of the first. So it was with Electronic. The boy’s muscles were impelled to make the first necessary movements. Again began days that were really tormenting: Electronic learned to walk, stumbling over all kinds of things. He almost wrecked himself falling, until he got accustomed to judging space dimensions.

“But in this, of course, our machine employed a unique circuit assembly. A photo-electric eye, connected to the memory-system, picked out the most important details of a situation. Then a special mechanism sized up the conditions involved and sent an alert to the required memory-block with the question: ‘What must I do



now?' And there, previously programmed experiences in dealing with various situations helped find an immediate answer. Electronic then acted according to previous experience. Naturally, the circuits were in action every second, and corrections were constantly dispatched to guarantee more exact movements on the boy's part.

"Now Electronic knew how to walk and control his muscles, but I put off taking him on the street—afraid—"

Gromov broke off and jumped to his feet at a buzz from the video-phone. The same militiaman as before appeared on the screen. His voice was just as calm—his eyes held the same amused gleam.

"We have more information," he said. "On Linden Avenue, during the track events, a boy in a blue windbreaker out-raced all the other runners. Identification marks coincide. However, when he was questioned after the race, he did not give the name of Electronic, but Sergei Cheesekov."

"Did he run very fast?" asked the professor.

"They say he may have set a new world record. This happened before the park incident."

"Then it's him," affirmed Gromov confidently.

"But there is a Sergei Cheesekov, 13 years old, and he really does live in Linden Avenue, at No. 5, flat 126," objected the duty sergeant.

"H'm!" the professor cleared his throat. "Some strange freak of the imagination. . . . I don't understand why he would think that up. . . ."

"Did you detain this Cheesekov?" Svetlovidov butted in.

"No."

"Then please pick him up and hold him for identification," said Svetlovidov firmly, "no matter what he calls himself. We'll wait for your call."

Both men returned to their seats, and for a short time were silent. Finally the professor shrugged his shoulders, saying:

"I simply can't understand it. . . . However, I'll finish telling you about Electronic. It's perfectly clear why I put off taking the boy on the street. So far he only knew what a room was like. The outside world would come as a shock—everything on the move, an ocean of sound. Outside of our voices, he knew nothing—never heard the barking of dogs, the roar of traffic, the sound of a ball bouncing.

"But Electronic took it in his stride, wasn't at all nervous. He regarded the world with simple curiosity, and our task was to explain things to him. The same houses, cars, animals, which he had seen only in pictures, were no longer flat but three-dimensional. Our cybernetics-boy saw flowers, grass, trees. I tried to give him an idea of the continuous processes going on in Nature. He noticed that houses, streets, motor-cars were not all alike; saw how the weather changed from day to day. And we discussed the different geographical regions of our planet, Earth, making social and climatic comparisons. In a word, I wanted him to get used to conditions of life in the world, and realise their great variety.

"It's not for me to judge how successful I've been. Personally, I considered Electronic to be courteous, quiet and truthful—and I didn't expect him to play such a trick as this. Then again, this strange name—Sergei Cheesekov. I can't imagine why he called himself that—"

And again the shrill video-phone signal.

The duty sergeant was short:

"Come at once. We've found him."

## **X-RAYS SHOW NOTHING**

Svetlovidov called a taxi. In five minutes they were already on their way to the militia station. The professor was silent, deep in thought. Svetlovidov was smiling to himself, picturing his meeting with Electronic, soon to take place.

"All the same, it's astonishing, the story you told!" he broke the silence. "Formerly an inventor or engineer created a new machine; then it went into production in a factory, and the machines were put to work at once wherever needed. Then computers came on the scene. They cannot work immediately after assembly. A programme-specialist has to feed it a programme of operation. But now even that isn't enough. For such complex systems as your Electronic, it's imperative to have a teacher with real talent."

"And here you see the result of the teacher's efforts—the militia," grumbled Gromov.

The militia station was deserted. Behind the desk sat the duty sergeant, a likeable young officer. He stood up, saluted, and shook hands with Gromov, saying:

"Glad to meet you, Professor. Excuse the delay in carrying out your instructions. The boy can really run, a regular rabbit. Electronic-Cheesekov is now at the polyclinic across the street. They're taking X-rays."

"X-rays?" Gromov raised his eyebrows. "Oh yes, the things he swallowed. . . . But in the present case, X-rays are useless. They'll only puzzle the doctor." Evidently he was thinking of Electronic's insides.

The officer was clearly confused by the answer.

"I was worried about his health," he muttered.

They crossed the street and entered the clinic. The officer rang the bell on the door of the X-ray room. The doctor came at once.

"The X-rays show nothing," he said, spreading his hands helplessly.

"What—nothing?" asked the three in chorus.

"No strange objects at all in the stomach," explained the doctor. "Heart's normal, lungs clear. A healthy youngster."

"Where is he?" the professor said impatiently.

"One moment. . . . Sergei!" called the doctor.

The door squeaked. A turned-up nose pushed through the opening, and a boy came out of the X-ray room.

The professor took a step to meet him, and stopped. He studied the youngster closely, and said:

"It's amazing! Utterly fantastic!"

"Hello, Electronic!" smiled Svetlovidov, extending his hand.

"I'm Cheesekov," said the boy quickly, thrusting his hands behind him.

"It's not him?" said Svetlovidov in astonishment, with a questioning look at Gromov.

The professor made a helpless gesture. His eyes, fastened on Cheesekov, were kindly.

Sergei smiled.

"You mean it's not him?" asked the duty officer. "We-ell... But, you know, all the witnesses were sure it was this very boy who swallowed the watches. They recognised him! Be honest now," he turned to Cheesekov, "did you do magic tricks in the park?"

"I never did any," muttered Sergei.

"And wasn't it you who ran in the relay?"

"Not me. Those sports fans got everything mixed up."

"And you don't know," persisted the officer with narrowed eyes, "who this Electronic is?"

"I don't know anything," cried Sergei, sounding desperate.

If only the professor had been a mind reader! He would have discovered everything: how Sergei had found a real, true friend and had been so happy up to an hour ago—and how afraid he was now of losing him. . . . No, he wouldn't give Electronic up to anybody! He wouldn't tell them that his new friend was sitting in his room, in the wardrobe closet; not one word, whatever these three did to him. . . .

"I don't know anything," Cheesekov repeated, morosely.

No, the brilliant Gromov could not read minds. And he said to the officer:

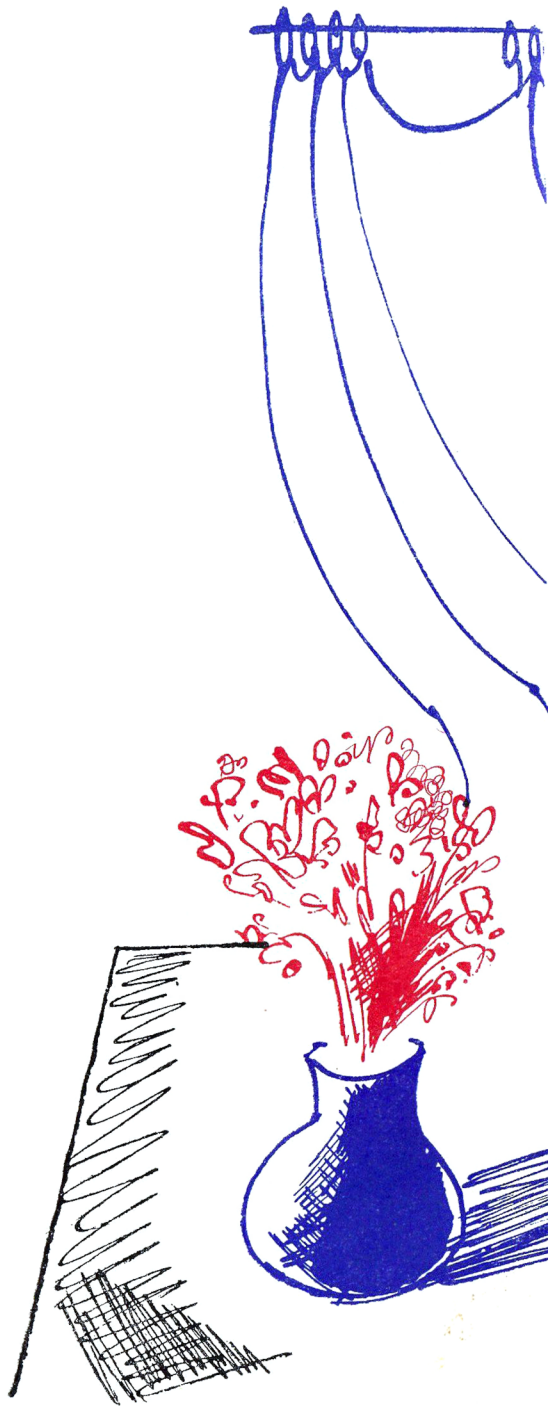
“Let the boy go. We’ve made a mistake. You heard the X-rays showed nothing!”

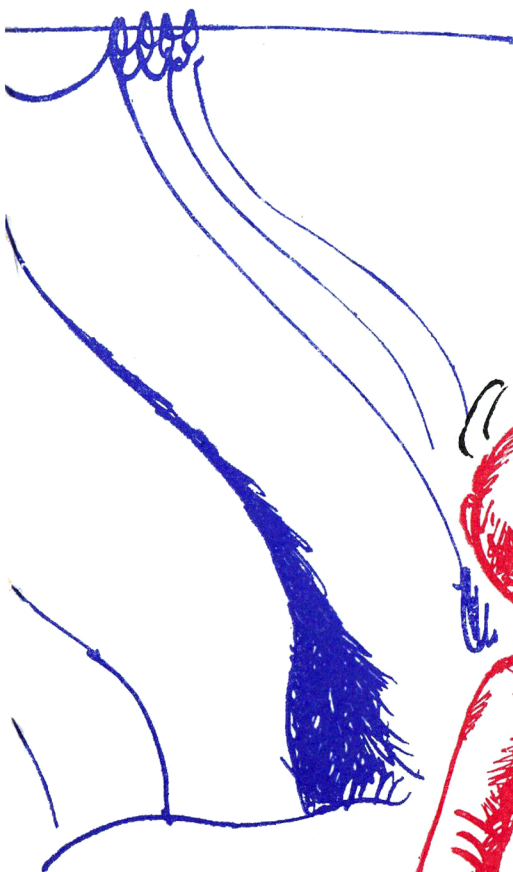
And Sergei left. But the four grown-ups remained in the clinic’s waiting-room.

“What a mess,” said the distressed officer. “You might at least give us a photograph of Electronic, Professor.”

“I haven’t one,” said Gromov. “But you just saw his photograph: there it is walking away on two legs. . . . Well, Sergei Cheesekov, eh? A likeable name.”

## The Secret









## YOU ARE ME!

"Electronic!" said Sergei, in a whisper, opening the closet door. "Everything's all right. I took the package to the Lost and Found Bureau. I poked it into the Receiving Box, and ran like anything. When they open it, they will find the combs, change purses, watches and pens. And there'll be no row."

"I didn't want to cause a row," rasped Electronic. "They gave me the things themselves."

"Ssh! Everybody's asleep!" warned Sergei.

Night. From the stretch of sky above, stars looked through the window. The moon was hiding behind a house-top. Near the school an overhead lamp shone, its cone-shaped hat throwing a gigantic shadow that mounted to the very roof.

"You feel like sleeping?" whispered Sergei.

"I never sleep."

"But what'll you do?"

"I'll read. Give me some books."

"What kind do you want? Detective? Adventure? Something funny?"

"Give me anything at all," said Electronic. "Pick out some poetry, too. It's good to read poetry. In poetry, each letter contains  $1\frac{1}{2}$  bits."

"What sort of things are 'bits'?" asked Sergei, surprised.

"A bit is a 'unit of information.' In colloquial speech, each letter has one bit. In poetry,  $1\frac{1}{2}$  bits. But 'bit' is only an abstract term. You may call it whatever you want, a Great Dane if you like."

"Here's a whole million Great Danes for you," said Sergei, taking some books off the shelf. "I'll get you a desk lamp in just a minute. But don't your batteries need charging?"

"I guess so. You know, I've reached the conclusion the current must have been of very high voltage this morning, and that's why I ran so fast."

"And what voltage should you have?"

“One hundred and ten volts.”

“Well, that’s simple. I’ll bring in the transformer we use for the frig, and right away you’ll get 110 instead of 220 volts.”

Quietly, Sergei carried in the transformer from the hallway, and brought a stool. Then he took a lamp from the table and made his friend comfortable in the big wardrobe closet.

Undressed, he slipped under the blankets and began watching the slit of light that cut the wardrobe from top to bottom. He lay there, looking at the golden strip, very much wanting to get up, peek inside the closet, and once more verify that all this was not a dream. But he heard the quiet rustle of pages, the mosquito-like buzz of the transformer, saw the two white electric cords snaking out from the closet to the wall-plug, and smiled in the darkness. . . . All of a sudden a sparkling merry-go-round whirled before his eyes, blue balloons bobbed up and down, stars twinkled—and Sergei was asleep.

He jumped out of bed on hearing the click of the lock. That was his parents going off to work. He flung open the closet door and laughed happily: Electronic had just reached the end of a big, thick book.

“Good morning!” Sergei greeted him. “Did you swallow a million Great Danes?”

Electronic looked up.

“Good morning! Five hundred thousand, one hundred and sixty bits.”

“What a brain!” exclaimed Sergei, with respect. “Now I’ll wash, and then we’ll look at my collections.”

There was a note on the kitchen table:

*Dear Sergei,*

*The frig is out of order. The food is on the window-sill. Have your lunch out. We’ll be back the usual time.*

*Mum and Dad*

“The frig will soo-n be work-ing,” sang Sergei, setting the transformer back in place. “But I don’t want any lunch.”

He fished his treasures out of the closet and from his desk and sat down on the floor beside Electronic. They examined and discussed Sergei's stamp collection, especially an outer-space series from different countries. They fingered the collection of badges, played Lotto and "A Trip Around Mars". Then they looked at pictures in old magazines, and solved mathematical puzzles. Sergei laughed all the time, clapping his friend on the shoulder. Electronic won at everything; he solved the puzzles after one look.

"Would you like me to make you a present of this stuff?" offered Sergei.

"What for?" asked Electronic calmly. "I don't want to swallow anything any more."

"Well, then they'll be OURS. Yours and mine. All right? Oh!" Sergei jumped up as he noticed the time. "Twenty minutes to get to school."

He gathered his books, feverishly muttering:

"The square described on the hypotenuse of a right-angled triangle is equal to the sum of the squares described on the other two sides. The square described on the hypotenuse . . . squares described on the other two sides. . . ."

"That's the Pythagorean theorem," said Electronic. "It's very easy."

"All very well to say easy. But this was my homework, and I didn't learn it."

Electronic took some paper and a pencil, and drew a few lightning strokes.

"Here's Euclid's proof. But there are other ways of proving it—by addition, subtraction—"

Sergei looked at his friend as if he were a magician.

"Isn't that something!" he breathed, in delight. "If I could do that. . . But Cheesekov gets a pair, that's for sure."

"What's a 'pair'?" asked Electronic with interest.

"Well, a pair—that's a Two . . . a bad mark. Five is excellent, Four is good, Three is average and Two is bad."

"Bad," repeated Electronic. "That's clear. I read in a book once: 'No matter how bad things are, there's always a way out.' Believe me, that's on good authority, it's a proven statement."

"A way out?" Sergei repeated thoughtfully. "There is a way out. . . ." He looked straight into Electronic's eyes, and reddened. "Couldn't you go, in place of me?"

"I could," said Electronic, in his impassive manner.

Sergei's eyes grew bright.

"We'll do it like this," and ran his tongue over suddenly dry lips. "Today you'll be Sergei Cheesekov, and," he paused, "I'll be Electronic. Look!" Sergei pulled his friend over to the mirror. "There we are—you and me. I'm on the left, you're on the right. Now I'll move over to the right. Look close now. Nothing's changed! Just as if you were still on the right. But now— You are me! Right?"

"Right!" repeated Electronic. "Today I'm Sergei Cheesekov."

"Mind you, keep mum. It's our secret," warned Sergei. "You understand? A secret! Not a word to anybody, to save your life. Swear by all that's holy!"

"By what?" asked Electronic.

"Well, by whatever's most important. What's the most important thing of all, to you?"

Electronic thought a minute.

"That I don't get broken," he spoke up.

"So, say it: 'May I get broken, if I give away this secret!'"

Electronic hoarsely repeated the oath.

"Now, listen hard!" Sergei told him. "You take my schoolbag and go to school. It's right there—in the courtyard. You go into classroom 7B, the first room to the left on the ground floor. When you go in, sit down at the second desk. That's where I sit, and in front of me is Makar Gusev, a big husky fellow. He'll badger and tease you, but don't you pay attention. Later, everything will go smooth and easy. First period you have Drawing; the second, Geometry—and you have to explain the Pythagorean theorem; the third is Geography. You know something about Geography?"

"I know all the oceans, seas, rivers, mountains, cities—"

"First rate. You've got everything straight?"

Electronic repeated what he had to do. He had everything down pat.

A moment, and Sergei had his bag ready; and to be on the safe side he took a peek outside on the landing. . . Was Makar Gusev around? From above came the sound of footsteps. It was the Professor—Vovka Korolkov—running downstairs.

"Hi!" he cried. "Have you read *Programmist-Optimist* yet? The paper writes you're a world champion runner!"

Sergei shrugged his shoulders:

"A champion's nothing. You'll be hearing more about me than that!"

He went back inside and told Electronic:

"Remember the park, and the old stage where we hid from the hunt yesterday? Can you find it? Meet me there after school."

### ***PROGRAMMIST-OPTIMIST***

Many people were familiar with the *Programmist-Optimist* newspaper. It was not only well-known in the Cybernetics Vocational School, but all along Linden Avenue. Even in the shops and on buses, you would overhear people discussing items printed in this paper.

*Programmist-Optimist* was a sort of bulletin—a school newspaper. Not difficult to guess who put it out. The mathematics pupils, that is, the programmers. Its name was the only simple thing about it. Even the number of the issue was coded into an equation—it was fun working it out, but you had to put your thinking cap on. Below this equation followed reports of different events, but the ordinary language was interspersed with puzzling bits of formulas, vectors, parallels, X's and Y's, etc. These reports were usually greeted with hoots of laughter. The young mathematicians simply ate them up—enjoying the irony, warnings or advice.

But the paper was not only meant for mathematicians. The paper was read by all the upper-school assemblers, who had no paper of their own. The lower-school youngsters liked the cartoons, limericks and snapshots. And there was always free space left where anybody could paste in a report of his own, an announcement or request.

The Professor was right. That Monday, everybody was reading and talking about only one column in the paper, headed "Hurrah for the Champion!"

And when the champion himself, schoolbag in hand, showed up in the corridor—silence fell. Spartak Nedelin came up to him.

"Are you Cheesekov?" he inquired.

"Yes, that's me," answered Electronic.

"Of course it's him!" screeched Makar Gusev, appearing behind the champion. "It's Sir Cheese-it Cheese-rot himself, in person!"

"Stop clowning!" Nedelin cut him short.

"Stop clowning!" added the Professor, turning suddenly against his friend, much to Gusev's surprise. "It's quite plain, the first to cross the tape was Cheesekov, and not Gusev."

But Nedelin was continuing:

"How did you manage it?"

"I don't know," answered Electronic.

The children burst into a torrent of talk.

"He hasn't seen the paper yet," one of them shouted. "Let him have a look."

Electronic went over to the paper pinned to the wall, and read the column through in a few seconds flat, almost at a glance.

"It's quite correct," he announced quietly. "Only there's a mistake in the equation used—should be a plus here instead of a minus."

"Right you are," said Nedelin. "Good for you! You've a head for mathematics." And Spartak corrected the mistake, clapped the hero on the back and went off.

The bell dispersed the remaining onlookers to their classrooms.

Electronic was already seated at the desk in the second row

behind Gusev's massive back, eyes fixed straight ahead. Beside him fidgeted the Professor, in an agony of remorse over the telescope business. He tried talking with Sergei, but the latter was silent as the grave.

Entering, the drawing teacher announced they would work outside that day. Desks banged, voices rang, and her noisy flock tore out of school and along Linden Avenue. Then, it was a race to the high cliff overlooking the river.

How many times they had been there! And just the same they paused, voices falling, eyes marvelling. There was a long and shining box-like glass enclosure set in a green spume of bushes and flowing down the sloping bank much like a glacier. Inside, it was divided into three bright strips of colour: red, yellow and blue. And along these bowled different-coloured blobs—skiers rushing down the coloured artificial-snow trails. They swooped from the top with great speed, cleverly turning to brake below where the enclosure widened and swelled out, for all the world like a huge soap bubble. And beyond the ski-enclosure, beyond some trees, you glimpsed a ribbon of river and the delicate arch of a bridge. There, everything was in motion: motor-boats, launches, cars, buses. Past the river, across the bridge, the whole city was lost in a hazy brightness.

And the children sat and drew everything they saw. Some boldly, confidently, with a fine grasp of perspective; others, out-of-true, hesitating, snatching up erasers. But all were silent, attentive, thoughtful.

"You will only make a pencil sketch, now," said the teacher. "Colour it in at home. Whoever wants to be an astronaut, engineer, flier, or research worker, must have a good visual memory for colour."

She walked behind the children, looking at their drawing-books, giving advice aloud. Now she was stopping near Cheesekov, took a look over his shoulder and asked:

"What's that supposed to be, Cheesekov?"

Electronic handed her his book and his rasping voice replied:

"That's the movements of the skiers."

In Cheesekov's book there were no contours of the city, but columns of formulas. And under them a roughly lettered text.

"I don't understand," said the teacher, shrugging her shoulders as she read aloud: "The present treatise does not pretend to cover all aspects of the questions involved. None the less, it is sure to be of use to anyone doing research in this field.'"

The young artists giggled.

"That's just the introduction, the beginning," explained Electronic hoarsely. "Further on, everything is more specific."

"You're not sick, are you?" asked the teacher. "Your voice is very hoarse. Probably you've caught cold."

"No, I feel fine," croaked the author of the treatise.

The teacher continued reading aloud from his drawing-book: "The author proceeds from an assumption that needs no proof, namely: the skier and his skis form a system of three vectors. An analysis of this system shows that it is stable only when the vectors of the system are in linear balance; two of them must be in parallel straight lines. . . .' Why Cheesekov! Are you using this lesson to write an article for the school newspaper? I can't understand a bit of it!"

"But why? It's all perfectly clear!" came a confident voice.

Spartak Nedelin, flushed and glowing after skiing, in a white sweater, stood beside the teacher.

"Do you mind, Galina Ivanovna?" he asked, taking Cheesekov's book. "I'll explain! This is a clever mathematical expression of how we ski. Our 9A form has just been on all three tracks. So, what is Cheesekov writing about? A system of three vectors—that's the skier and his skis. Naturally, they are dependent on each other; otherwise no skiing could be done. And two of them, the skis, glide over the snow in parallel lines. That's what Cheesekov says. We read further: 'A very stable system consisting of 3 vectors has been self-tested by several investigators.'"

Spartak could not keep from laughing. "Very sharp, that! Victor Popov and no mistake. A few minutes ago, he fell on his back and slid



down behind the skis. Well, Cheesekov, I never knew you had such a nimble pen. This needs to be put in the paper. And a funny drawing with it. I think we should call it: 'Skiing and Algebraic Vectors'."

"I don't know about the paper," observed the teacher drily, "but he hasn't done his drawing."

"You must let him off, Galina Ivanovna!" begged Spartak. "Sometimes we get carried away and just can't help it. And see how well he did this! He can draw a landscape later."

"Very well," said Galina Ivanovna to Cheesekov. "That will be your homework. I'll make a note to ask you about it next lesson. . . All right, children, the lesson is over. You may return to school."

Makar Gusev came up to Electronic and pulled him by the sleeve.

"It looks like you're really smart, Sergei! And I didn't know!" Makar bent over and whispered meaningly: "Listen, let's slip away and go swimming."

"I can't swim," said Electronic loudly.

"Quiet!" Makar gave him a warning look and clenched a fist. "What're you afraid of? We'll be quick, and nobody will notice."

"I never go swimming," was the quiet answer.

Such a bare-faced lie left Gusev open-mouthed. And whose picture had been on the covers of all the magazines? Everybody had seen the picture of Cheesekov climbing out of the pool, grinning all over!

"Take a look at Momma's boy!" Makar bawled out. "He's afraid to get his feet wet! He never goes swimming. . . . Oh, can he ever pile it on!"

Makar never suspected how close he was to the truth. Swimming, for Electronic, would have amounted to suicide: water inside him might short-circuit the whole of his intricate mechanism. Gusev was screaming now at the top of his lungs to draw attention to the recent champion. But Cheesekov's next question surprised him into silence.

"What does that mean—'pile it on'? I'm not piling anything on you."

"You're absolutely nuts, Cheesekov," Gusev gave a disgusted wave of his hand. "You don't understand everyday speech. . . . Or are you shamming?"

"He's not shamming," the Professor broke in. "When I'm thinking about something, I forget the simplest things—spell 'cow' with an 'a' and such like. Anyway, stop nagging him, Makar. Can't you see how hoarse he is? How can he go swimming!"

"So what! I've been in swimming twice this morning. And I'm as fit as anything!" Gusev grabbed up a large stone and flung it over the cliff. "Feel my muscles, Vovka!" he told the Professor. "Iron! Hey, Champion, race you to school!"

Cheesekov did not even look back.

"I don't like it," called out Makar, "when people do things just to show off. Maybe you can beat the world champion once. But just you try it every day. . . ."

And Gusev darted off to school.

### **"THE BRIDE'S CHAIR"**

Taratar was the name of their maths teacher. He was well liked. Taratar never hurried to hand out bad marks. When a boy at the blackboard mumbled and contradicted himself, he would give him a somewhat mocking glance—through his spectacles, and twitch his thick, brush-like moustache. Then he would ask for volunteers to explain the mistake, and tell the class:

"If anybody doesn't know the work we're taking up, let him raise his hand and say so without wasting our time. It doesn't matter to me why: whether he was out buying skates, visiting, or simply forgot to learn it, I won't give him a bad mark. But it's a debt—he must learn it, and I'll ask him sometime. . . ." And Taratar never did forget to check the culprit on this point later on.

While Gusev was drawing diagrams of the Pythagorean theorem on the blackboard, Taratar walked along the aisles hands behind his back, bending over and glancing at all the notebooks.

"We-ll," he asked Gusev, "are you through?"

Makar nodded.

"Would you all do it that way?" Taratar asked the class.

"No," the Professor spoke out.

"Well, Korolkov, tell him what's wrong."

"You have to put a diagonal line in the rectangle."

"Right. Now, Gusev, prove the theorem."

With the Professor's help, Makar just managed to do it. Breathing heavily, he took his seat, and the Professor gave him a hand brushing the chalk from his jacket.

Again the teacher turned to the class:

"This proof is found in your text-books. Does anyone know a different one?"

Before the Professor could raise his hand, Electronic stood up.

"I do."

Taratar was a bit surprised—Cheesekov had never shown any special initiative, and here he was on his feet, he was so anxious.

"Proceed, Cheesekov," he said.

"I could give you twenty-five proofs," announced Electronic in his rasping voice.

A hum of excitement ran through the room.

Taratar's moustache jerked up in surprise.

"Well then, well then, go on . . ." he said, but was thinking: "The boy's voice is changing. He's just the age. And how sure of himself. . . . Let's see if he can play the role to the end. . . ."

The chalk in Electronic's hand raced across the blackboard, swiftly, and already a triangle was drawn surrounded by squares.

"The simplest proof of the theorem is that of Euclid, the famous mathematician of ancient Greece," he said hoarsely, and in a matter of seconds he startled his audience with an exposition of Euclid's proof.

"Scientists believe," continued Electronic glibly, "that Euclid himself thought up this proof of the theorem. As for Pythagoras of Samos, we only know that he lived in the sixth century B.C., constructed this theorem, and headed the first school of mathematics in the world. More than 2,000 years ago, Euclid gathered together all the axioms known at that time. One might say he founded geometry. And Euclid's geometry existed without change up to the nineteenth century, when the Russian scientist, Nikolai Ivanovich Lobachevsky, developed spherical geometry."

"Right," confirmed Taratar. "Continue, Cheesekov."

The class was struck dumb with surprise. Even the two idlers in the back row stopped playing their game of "Sea Battle".

But Electronic had already drawn three new figures. He told the class how the ancient Chinese, Greeks, Indians and Arabs formulated the famous theorem.

Taratar was only able to wedge in:

"In ancient times, boys and girls, the Pythagorean theorem was known only to a handful of scientists, initiates of the secrets of mathematics, while today everybody learns it."

Electronic's chalk drew and drew, piling up squares and triangles, making squares out of triangles, dividing squares into triangles. Words fell from Electronic like rain:

"Addition method . . . subtraction method. . ."

The board was covered with polygons of equal sides; everybody saw the outlines of parquetry and were surprised to hear that these were also proofs of the Pythagorean theorem.

For Electronic confirmed it: "The method of 'laying parquet floors.' That is what it's called."

Again he built squares on the sides of a triangle, divided them in equal parts and, turning to his audience, made a short speech:

"In this case, all the arguments may be seen at a glance. Just look! It's as clear as day!"

Taratar nodded his head, smiling.

"Finally, the 'Bride's Chair'," rasped out Electronic.

The class could not keep out a roar of laughter.

"I'm telling the truth," said Electronic, turning towards the class once more. "The 'Bride's Chair'. I didn't think it up—that was done in India, in the ninth century."

The "Bride's Chair" was already drawn on the blackboard. It was a pentagon, a five-sided figure, balancing on one right angle, with part of it protruding above to make a seat. It is not very often you find such an unsteady chair to sit on!

The children were laughing again, but fell silent when "Cheesekov" began reciting poetry:

*Eternal truth will only come to stay  
When erring man may grasp it with his mind!  
The Pythagorean theorem today  
Holds true, as in the age it was divined.*

Then Taratar joined in, and they recited the rest together:

*Burnt offerings to God still more and more  
Made Pythagoras, each in solemn rite  
One hundred bulls he gave, but to implore  
That through the clouds might break a ray of light.*

*So always from that time, bulls bawl irate,  
As if at sacrificial smoke, when earth  
Unto a tiny ray of truth gives birth.*

*Though they are powerless to interfere  
And stop the light, eyes closed they shake with fear  
That Pythagoras caused to be innate.*

Their voices stilled. Taratar took off his glasses and polished them with a handkerchief.

"That's a sonnet by Chamisso,\*" he said, with emotion.

Makar Gusev winked at the Professor. They seldom saw Taratar so moved; usually the teacher was calm and sardonic. Makar

\* Chamisso, Adelbert von (1781-1838)—German poet and botanist, creator of Peter Schlemihl, who sold his shadow.

was ready to take back everything he had said about Cheesekov an hour ago on the riverbank. He waved his hand in conciliation.

"Sit down, Sergei," said Taratar. "It's a pleasure to give you Excellent!"

"According to my Daily Report Book, you have a question to ask me," Electronic reminded him. But his simple remark sent Gusev into fits of laughter.

"There are no more questions," smiled Taratar. "You have an irrefutable Excellent. . . ." He turned to address the class. "Gusev, be quiet, please. . . . I have a suggestion to make. Next lesson, an assistant will take the chair, here at my desk. His job will be to explain to you the more difficult aspects of your homework. Naturally, the assistant must do his prep work better than the rest. You will each take a turn of duty. Agreed?"

"Agreed!" came the unanimous answer.

"Then, Cheesekov will be the assistant this week. . . . And another thing. What's important in mathematics is not the formulas, nor the calculations—but the play of thought, new ideas. I've already spoken about this, but today your classmate has brilliantly confirmed how true this is. Your studies are like making a journey. Every day new mountains face you. After you climb one, you find another waiting. And the more mountains you surmount, the stronger you will be. . . ."

Taratar left the room. The children crowded around Cheesekov, talking loudly and excitedly.

"Well, aren't you the hero! . . ."

"Some fellow!"

"You made short work of old Pythagoras."

"Now let the ninth-formers try to act stuck up. We have our own genius!"

"And champion runner!"

"And reporter for the *Programmist*."

Louder than the rest was Makar's bass voice:

"We've got our own Pythagoras! There he is—sitting on the 'Bride's Chair!' Hip, hip for Cheesekov!"

Spartak Nedelin ran in, waving a blue ticket.

"Cheesekov, where are you?" he cried, above the noise. "Here, take this! A ticket to the circus—your prize from the *Programmist* editors. And get busy on something else for the paper!"

### THREE CHANCELLORS OF THE THEOREM

Deep in the park, far from the Linden Avenue entrance, stood a small, well-worn stage with a yellowed screen. Movies were not shown here very often, so the band-shell stage was the favourite haunt of all the boys. Here, only yesterday, the hunt had passed by in search of the magician and his friend running from an angry audience.

Sergei clambered up on the stage, and stretched out on the rough boards. . . . A life of freedom had begun! No more school, no more homework. Electronic knew everything. If you wanted—look at the sky through the chinks in the roof. If you wanted—dream about anything at all. If you wanted—go for a ramble in the park. . . .

He lay on his stomach for a while, yawned, turned over on his back and began counting the boards in the roof. A ray of sunlight passed through a knothole, casting a bright spot on the floor beside him. Sergei took a mirror from his pocket, caught the ray in it, and began reflecting sun-spots into a dark corner. All the children called these sun-rabbits, from time immemorial. Sergei's sun-rabbit ran across the old boards, disturbing spiders in their webs, and hopped up on the screen.

Suddenly the rabbit disappeared. It had only just been there, on the yellowish linen screen. Now it had disappeared. The beam from the mirror reached out like a shining sword towards the screen but left no bright sun-spot—it seemed to pass right through the cloth.

Again Sergei caught the ray of sunshine in his mirror and reflected another rabbit in the lower corner of the screen. The

rabbit hopped and jumped, and once more disappeared in a flash. As if covered by a gentle, unseen hand.

Keeping the beam of light aimed at the same spot, Sergei moved with beating heart close up to the screen—and turned sharply, sensing that someone stood behind him.

He saw a pale little girl, her hair in one thin braid, carrying a basket covered with a gray cloth.

Sergei gaped open-mouthed, wondering how the girl could have got behind him, but she forestalled any question with a strange remark:

"It was my grandfather who caught your rabbits." She leaned towards Sergei and confided: "He's the best hunter of sun-rabbits in the whole country."

Sergei opened his mouth wider still but again could not get anything out, for suddenly out of nowhere appeared a gray-haired old man carrying a large butterfly net. He held something shining, glittering, fiery gold. Impossible to look at such brilliance, without your eyes aching.

Sergei narrowed his eyes, covered them with his hand and peeked through his fingers at the game the old fellow had bagged. The girl had not lied—he was carrying flame-bright rabbits, holding them by their long ears! They looked as if they were creatures of the sun itself.

"Thanks, sonny," the old man said kindly. "You brought me good hunting, though you did make me jump after them. But it's time to go home. Do you want to come with us? You'll find yourself in a town you've never seen before."

"Ye-es," stammered Sergei. He wanted very much to see the home town of people who hunted sun-rabbits.

They went along a straight road, which cut through a wood.

Sergei kept turning his head, looking at the trees in amazement. It was a strange wood, all right. The trees looked like ordinary fir, birch and pine—however, their trunks were not round, but flat as rulers; and their branches grew only out of the sides, right and left.



"It's not far now," remarked the old man. "The clearing's just ahead, and then the town begins."

It was true. The arrow-like road, shooting out of the woods, became a town street. It was lined with ordinary houses having triangular roofs, square windows and rectangular doors. People and vehicles moved along the street. But from his very first step, Sergei was seized with alarm. He saw some passers-by only from the front and from the back, and could not observe them at all during the moment of passing. Of others, he caught only a side-view as he passed them, but from a distance they looked like thin sticks or fine lines.

The old man called out to him:

"Well, sonny, you go for a walk through the town with Anna. But I'm going home. You're lucky. Maybe you'll bring good luck to my granddaughter."

"Shall we go?" asked Anna, and shook her basket. "Is it true you bring good luck? I haven't sold anything for days now."

"But what are you selling?" asked Sergei. "Toffee?"

"N-no," and Anna shook her head. "We don't sell toffee. My basket is full of—smiles!"

"Smiles?" laughed Sergei, though he did not at all feel like laughing.

"Look!"

Anna pulled the cloth from the basket, and Sergei closed his eyes tight against the sudden, unbearable brightness.

"Grandfather makes the smiles from rabbit skins," continued the girl. "I thought you already guessed. Only they don't sell very well."

And she turned to the strange passers-by, those walking-outlines:

"Buy a smile! Very cheap. Ordinary smiles—sad ones, mournful ones. Smiles for everybody: children, grown-ups. Who wants a smile?"

But nobody wanted to buy the smiles. The pedestrians walked past, swinging strangely thin briefcases. They paid no attention

to Anna or her golden basket. Their faces were concentrated, their movements exact, their eyes riveted ahead. Even the dogs pattered silently, mysterious as shadows.

And suddenly it dawned on Sergei—he knew what was wrong. Everything here was flat, two-dimensional!

He looked hard at the street. It really was a two-dimensional town. Motor-cars, houses, street-lights, trees, people, even the dogs—all were flat as pancakes, as if cut out of cardboard or paper. Even Anna, standing beside him, was just as flat. And she had only one braid. How come he had not noticed it before!

And now a man approached them: an important one, with a huge stomach. You could only see his profile. More than likely he considered himself fat. But just the same, if you looked at him from behind, he was thin as a needle.

Sergei could not keep from laughing as he looked after the tubby figure so suddenly thin from behind. He tried to imagine what kind of narrow chair he would need to sit on. And his bed could be narrow as a ruler! And what kind of sandwiches would he eat? He might enjoy cigarette paper, not sandwiches.

Sergei laughed till he cried, not noticing that Anna was watching him guardedly, that the passers-by had stopped, that a little crowd had gathered. The flat people looked at the merry lad severely, exchanging angry remarks:

“What manners! I was only just concentrating on something important, when suddenly there was this terrible laughter. He spoiled all my calculations.”

“Yes indeed, such things really do spoil the flow of thought.”

“I always said, for children who are too playful, we need to open a special school with an arduous draughting curriculum.”

“And what’s more, this girl is forever underfoot! Who wants her foolish smiles?”

“Quiet!” cried out somebody, in fright. “The Theorem Chancellors are coming.”

The crowd silently parted, letting through three important figures.



All in the same style, their dress might have been described as three squares and a triangle, but all the same they were not exactly alike. One of them, with a square head and sharp eyes, was arrayed in an old-fashioned professor's gown. Another, very short, wore a huge, tall silk hat on his head, with his hands in his pockets and an umbrella under his arm. The last came through the crowd, hands raised to the sky, as if giving warning. That's what they looked like, the three Chancellors of the Theorem, as they slowly approached Sergei.

To tell the truth, at this moment Sergei was afraid. They looked very grim.

The three Chancellors stopped in front of him, and silently looked him over. Then, the one in the professor's gown said in an unexpectedly squeaky voice:

"We were informed you are violating the law and order established here from ancient times. Do you realise, Stranger, that you are in the Country of Two Dimensions?"

"Yes," and Sergei nodded in assent.

"Do you know," continued the squeaky voice of the Chancellor, "what the sum of the squares described on the two sides of a right-angled triangle is equal to?"

"The square described on the hypotenuse," muttered Sergei a bit doubtfully.

The Chancellors exchanged glances.

"He's not such a fool as he looks," remarked the short one in the tall hat.

Sergei looked at the three Chancellors from head to foot, and tried to remember where he had seen these triangles and squares before. But of course—on the school blackboard. Taratar had drawn them!

"The Pythagorean theorem!" he blurted out.

"You know that name?" exclaimed the Chancellor with upraised hands, in surprise. "I warn you, pronounce it with respect, if you please! Because everything you see around you is based on this undying and glorious discovery. . ."

Sergei was already sick of the pompous Chancellors and their lofty tone. While listening to the above speech, he was imagining what the Chancellor making it would look like upside down, and he giggled.

"What do you find so amusing in what we are saying?" asked the Chancellor severely.

The crowd began to mutter threateningly. . . "No," thought Sergei, "it wasn't worth while making them angry."

"Don't pay any attention," said Sergei. "I always laugh like that when I remember about the 'pants' of Pythagoras."\*

"Please explain what you mean."

"Well, it's always easier to remember the theorem this way—Pythagoras can't disclaim, his pant-legs all ways are the same."

"Oh," the three Chancellors cried out. "That's a proposition even we don't know!"

They took chalk out of their pockets, and began to draw figures on the pavement. Nobody paid attention to Sergei any more. They were all watching the Chancellors.

Sergei went over to Anna, and bragged:

"There, I've given them something to work on. Give me a smile in reward."

The girl looked at him with awe, as if he were a magician. Mechanically, she put her hand in the basket and handed Sergei a twinkling smile. Waving it, he said importantly:

"Let them think it over till morning. You come and see our courtyard. It's absolutely different there. We'll play ball, with a real round one, not flat. And our cats are fluffy and soft. And the dogs! You've never seen such dogs! You should see how Crazy Baloney chases his tail—you'd die laughing. And maybe I'll introduce you to my friend, Electronic."

"I'd like so much to play with a round ball," breathed Anna. "I'd love to see a fluffy cat. But I don't know what 'round' is. I guess I'll never see anything that is round or fluffy!" And she even

\* Schoolboy joke—Russian schoolboys jokingly refer to the squares on the sides of such a triangle as the Pythagorean "pants".

began to cry, bitterly, wiping away her flat tears with a golden smile.

At that moment the three Chancellors came over to Sergei again.

"Tell us, Stranger, where do you come from?" asked the little one in the tall hat, very severely.

Sergei thought for a minute. Should he say he was from Linden Avenue? They would not understand. So he said:

"From Earth."

"Seeing we've found a common language," the little one continued, "I suppose your Earth is similar to the Country of Two Dimensions? Is it just as big, and flat?"

"It's very big, but it isn't flat; it's round," said Cheesekov frankly. "That's an old wives' tale, that the Earth is flat."

Dumb struck, the crowd drew a long breath.

"You're much mistaken, boy!" pronounced the Chancellor with upraised hands, very sternly indeed. "Do you mean to assert, after bringing to our attention a new proof of the Great Theorem, that on your Earth the sum of the angles of a triangle is not equal to  $180^\circ$ ?"

The question puzzled our mathematician a little bit. He knew very well that the sum of the angles of a simple triangle was  $180^\circ$ . But on the round surface of the Earth? He pictured up a great globe, and constructed on it a triangle with the top at the North Pole and the base along the equator. There remained to figure out what the sum of its angles was equal to.

"Judge for yourselves!" said Sergei. "Here's the Earth for you." And he took a kopek from his pocket.

"I said it was flat," observed the Chancellor, instructively, as he saw the coin.

"That's not the Earth!" warned the boy. "Can you possibly think that the whole world is built on one theorem?"

Sergei squatted down, held the coin on its edge against the ground, and gave it a flick with his fingertip. The coin spun round on the spot, looking like a shining ball.

"A-ah!" cried Anna, "how beautiful!"

"He's a fraud!" came shouts from the crowd. "See how his appearance changes; he's different on all sides!"

"Yes indeed, he's completely different when he turns round," an angry voice joined in.

"He wants to make fools of us! Just look at that drawing on the pavement. He's suggesting the Great Chancellors of the Theorem are like pant-legs, the same in every way."

A very brisk fellow, bent nearly double, suddenly emerged from somewhere and whispered to the Chancellors:

"A dangerous troublemaker! He's been persuading the smile-seller to play with a round ball and fluffy cats, and they simply, don't exist. Have to put him in gaol at once! . . ."

"Gaol him! Gaol him!" joined in all the flat people.

"Run!" Anna whispered to Sergei, and threw her basket of smiles high up in the air. The cascade of sunny sparks flew all round, momentarily blinding everybody.

And Sergei started to run. Confused, he tore along the street, knocking over the flat figures. Then he turned and, in desperation, darted right through the flat houses. They broke and went crackling down, catching at his clothing. And behind him pounded the hunt.

Here was the wood—like a palisade of rulers stood on end. It also crackled and broke under his flying feet, as if it were not so much a wood as dry grass. A few more yards and he would be saved. He would get back into the real park, where real people walked about, and where Electronic was waiting.

But somebody caught Sergei by the leg, and he fell. Squeezing his eyes tight shut, he waited what was coming. Again somebody pulled his leg. Sergei opened one eye, and saw Electronic.

"Electronic!" he screeched happily, and jumped up. "You saved me!"

"Do not exaggerate," said Electronic. "I only got one Excellent, some homework to do in Drawing, and a ticket to the circus."

They stood at the back of the stage, behind the cinema screen.

Sergei fingered the blue ticket in surprise. He could not understand it.

"I'll tell you in a minute how it all happened," Electronic told him. "But first we've got to get some sweets."

"What do we want sweets for?"

"What for? How can you ask! We're going to the circus, aren't we?"

### **ELECTRONIC'S FIRST FAILURES**

At a near-by stall they bought some sweets, and Electronic took charge of them.

"Shall we eat them at the circus?" asked Sergei.

"No, that's not the idea."

Electronic did not say any more. But Sergei smiled to himself knowingly. He felt sure that something wonderful would happen at the circus.

What an extraordinary friend he had! Only a few hours had passed since they parted, and already Electronic was a sensation at school. He had even astonished Spartak, and Taratar too, and won a ticket to the circus! Even the Country of Flat People, which Sergei was then describing to his friend, seemed to have lost its former glamour.

"Probably, when you were drawing all that stuff on the black-board in class and I was waiting for you, I was also thinking about the Pythagorean theorem," concluded Sergei soberly. "And that's why I dreamt about that stupid country."

But Electronic took the story differently. He began to consider it seriously, in detail, not in the least doubting the reality of Sergei's adventure. Sergei began to feel that he really had been in the Country of Flat People. He remembered Anna, and was sorry for her. Here they were, Electronic and he, walking along and looking at the sparkling river, the hydrofoil hovercraft flying along on their stepped wings scarcely touching the water, the yachts whose sails flashed like bright butterflies, red, yellow and



white. But there—how monotonous life was for those flat people! Just the Pythagorean theorem, the sum of the angles in triangles . . . and nothing else.

But Electronic said that Sergei had been lucky: it was as though he had got into ancient times when people revered Euclid alone. And Sergei had acted like a real scientist, posing a very clever question to the Chancellors. They were accustomed to the fact that in any flat triangle the sum of the angles was  $180^\circ$ , but here, if you please, the sum was  $270^\circ$ . A triangle on the globe of the Earth—that was no longer Euclid, but spherical geometry.

The young mathematician felt like a hero. He really had puzzled those Chancellors. They never solved his question.

"You should have set them another problem—a triangle in space," said Electronic.

"M-mm," drawled Sergei thoughtfully, "that would probably be interesting."

"Of course."

"Well now, tell me about it, if you don't mind. Somehow, I seem to have forgotten," said Cheesekov, resorting to craft rather than display ignorance.

Electronic picked up a stick and drew three stars on the sandy pathway.

"Here are three stars in different galaxies. You've got the picture?"

"Yes, I get it."

"These are the three vertices of our space triangle," continued Electronic. "Imagine that its sides are light rays. It is a known fact that a light ray in space is always a straight line. But the point is that when the rays come close to the stars they become curved."

"Oof! That's a low one. . . How can that be?"

"It's a law of physics. The sun, the stars and other heavenly bodies cause distortion in space around them, and that's why our triangle is not a plane triangle." And Electronic joined all three stars in his sketch with curved lines.

"That's clear," said Cheesekov, "though a bit strange. It works this way: if I want to fly from one star to another, then I don't fly straight, but along a curve?"

"Absolutely correct," pronounced Electronic, sounding like a teacher. "But that's not all. Don't forget, the stars are moving all the time. The galaxies are rushing away from the Earth at enormous speed. Then try to measure the sum of the angles of your space triangle."

"Yes," repeated Cheesekov. "Try to measure it. But can you?"

"No, I can't," admitted Electronic. "Astronomers, physicists, mathematicians—they're all working on spatial geometry. It's a complex science."

Cheesekov suddenly clapped a hand to his head in surprise.

"Ooh! Then why are we wasting our energy at school over such things as Pythagoras and Euclid, when geometry is absolutely different today? Why didn't you say so before? Have to explain it to the teacher."

"And now you're talking not a bit like a scientist," Electronic rebuked him. "Even so you need the Pythagorean theorem for simple calculation and experiments. Euclid is part of the geometry of our world today, and you have to know it too."

"And here I was thinking," remarked Cheesekov, "how lucky I was NOT to be born in ancient times. I might have just sat at my desk and prayed, like those flat people: 'O mighty Pythagoras, you have enlightened my mind. . . .' No, friend Pythagoras, I'm not such a duffer. When I become a mathematician or an astronomer, or an astronaut, and fly into space, I'll travel a special route—a triangular one. And the sum of the squares described on its two sides will not be equal to the square described on its hypotenuse! . . ."

A little later, after Sergei had turned the conversation away from geometry, he led his friend towards a secluded corner of the park. It was here, at any time of day, that the boys traded their personal little treasures.

They had three hours before circus time; and Sergei decided to

give Electronic a little treat. Nearing a lilac bush, he emptied his pockets of all his wealth and spread it on the ground, royally authorising his friend to trade the lot with the boys. It was quite an assortment: a series of space stamps in a cellophane package, a dozen badges, a burnt-out pencil-size pocket torch, two old coins so worn with use it was impossible to make out either the country or the year, a few parts from a transistor radio, a red squirrel's tail with a lead weight—called a puff—which the boys kicked round in place of a ball, a few chessmen, a rocket-shaped eraser, a pair of compasses, a foam-rubber fishing-float, and a pocket mirror.

Electronic stared at the pile of amazing things, and asked:

“But why must I trade them?”

“It's a sort of game,” explained Cheesekov. “You'll see how interesting it is.”

He helped Electronic stuff everything into his pockets, and then hid behind the lilac bush to await results, deeming it prudent not to show up with Electronic before his friends. He began imagining how good Electronic felt just then, sitting on the bench trading his hoard and choosing what he wanted. It was a wonderful game, and added variety to life. Say you get fed up with a pocket torch, for instance—such an eyesore, it's not fit to look at any more! So you go to the spot by the lilac bush and trade it for a bicycle bell or a pocket chess-set or something else. . . . (This is probably the oldest game in the world, and will never die out as long as boys have pockets.)

In less than five minutes, Electronic was back.

“Well?” asked Cheesekov impatiently.

“Everything's fine. I traded them. I've brought other things,” coolly announced the new trader.

But when the things were spread out, Sergei grew pale. He saw an empty medicine bottle, a piece of exposed film, a few stamps which could be bought anywhere, a home-made cardboard change purse, an empty matchbox, a doll without a nose or eyes, some school pen-nibs, a few old nuts and bolts, some nails and, to crown

all, the stub of a pencil. The sorry pencil-stub was the final blow. Cheesekov looked reproachfully at his friend, who had made him bankrupt in a matter of only a few minutes.

"There is exactly the same number of things here as those you gave me," reported Electronic, impassively.

"Ye-es," drawled Cheesekov, not knowing whether to laugh or cry, whether to throw this junk away or pocket it with resignation.

Suddenly he reached a decision. Gathering up all the junk, he gave Electronic an order:

"Wait for me here!"

"Are you going to trade too?" asked Electronic, completely unaware of his failure.

"You see, there are some things here I don't like. I'll be back in a minute."

The group around the bench met Cheesekov in watchful silence. Sergei even noticed how one red-headed fellow hurriedly hid away his pocket torch. Paying no attention, our hero spread out his pile of things on the vacant bench, and cried loudly:

"Well now, jump to it! Let's trade!"

A burst of mocking laughter was the answer.

"Cheated me, and they're glad. Neigh like horses. . ." Cheesekov thought to himself. "Never mind, they'll soon cry a different tune."

"Changed your mind!" the boys yelled at him. "Nothing doing. A trade is a trade! No taking back. Go roll your hoop!"

"In return for the pocket torch," continued Cheesekov, showing no emotion, "I'm offering this ordinary matchbox—but into the bargain, you get an extra-special magic trick with matches!"

The red-headed owner of the pocket torch screwed up his lips in contempt.

"Extra-special! You'd think we never saw matches before!"

The boys roared with laughter. But Sergei pulled out his handkerchief, waved it in the air, and said imperiously:

"Give me a match!"

They gave him one.

"All the magic," Cheesekov explained quietly, "consists in how you wrap the match in the hankie." He enclosed the match, and turned to the red-head: "Touch it. You feel it? Now break it."

Everybody heard the wooden stick crack. Afterwards, the magician waved the handkerchief, and a whole, unbroken match fell to the ground. The red-head managed to grab it first. He turned it this way and that, held it close to his eyes, sniffed it. The astonishing match passed from hand to hand among the boys.

Then the red-head handed Sergei the torch and took the match-box.

"Now explain it," he demanded.

"I'll explain it after," Sergei waved him away. "I haven't time now."

He took up the dolly without a nose.

"This beauty is to be traded together with the explanation of the puzzling story of how elephants die and why no one ever finds their remains."

And though the story, it appeared, was not so puzzling after all (a few minutes and all knew that when elephants feel death approaching they look for a river and walk in till the water is over their heads), business was very brisk for the resourceful trader. As additions to his assortment to trade, Sergei made the following offers: the secret of shaking a raw egg into a glass without breaking the shell, how to make a finger disappear from your hand, a prescription for a magic potion to make you ten times stronger, hypnotic seances, the problem of a space triangle, charming away a toothache and other things of the same kind. Using all his cunning, imagination and memory, Sergei finally got back all his treasures except the old coins. The new owner had run away right after the trade was made, but he would never guess what country the coins came from.

"But the match trick?" the red-head reminded Cheesekov when he was dividing his personal treasures among his various pockets.

"Come over here," said Sergei, taking him aside. "It's a professional secret."

The red-head followed, unsuspecting. They stopped by some bushes, and Sergei whispered in his ear:

"You fool! I put in two matches. Understand, blockhead? So long!"

And he dashed off to Electronic. Why should he tell the red-head that the second match was hidden beforehand in a slit in the hem of the handkerchief? Give away a professional secret? What for!

So once more Electronic saw the things he had squandered away on trifles, but could not understand why a second trade had been necessary. And while Sergei tried to explain to him the complex business of comparing the value of each treasure in his pockets, they walked towards the circus, at peace with the world, intending to buy another ticket.

Suddenly, a familiar blue dress caught Sergei's attention. From the suddenness of it, he stumbled and almost fell.

"What's wrong?" asked Electronic.

Sergei did not answer, dumb struck. Walking indifferently by, not even looking their way, was the very same girl who had sung about balloons, and laughed at Electronic's magic tricks.

For the first minute, Sergei wanted to do what all the boys usually did in a situation like this: run ahead secretly, and afterwards stroll back to meet her, say "hello" and stop to chat. But a minute later, he decided not to do it himself. Better let Electronic go. After all, he was the one the girl had smiled at and applauded. Sergei hastily and briefly explained to his friend what he had to do: get acquainted, and find out her name and address.

"Only don't forget," he warned threateningly, "that you're Sergei Cheesekov. Remember the oath—'May I be broken if I give away the secret!'"

Electronic obediently repeated the oath and started out. Strange as it seemed, he used the same method which had seemed not quite good enough to Sergei—he hurried ahead, turned back and, standing in her path, went into action:

"Hello! Couldn't we get to know each other? What d'you say?"

"Hello. . . ." The girl in blue looked at Electronic in amazement. "But it seems to me we DO know each other. . . . Wasn't it you who did magic tricks?"

"It was me. May I know your name?"

Cheesekov, who had long ago crept up behind the girl to listen, shook his head in surprise—that dare-devil Electronic was acting exactly according to instructions.

"But is that absolutely necessary?" The girl tilted her head to one side.

"Absolutely."

"May Svetlova. And yours?"

"Sergei Cheesekov."

"But why was 'Electronic' written on the kerchief?"

Sergei felt a chill run down his spine—would Electronic give the show away? But, after thinking a minute, Electronic found an answer.

"It's my stage name. And what's your address?"

The girl's face became severe. The magician asked too many strange questions.

"What curiosity you have! Better tell me this! Did you return what you swallowed? What was it, sleight of hand, or did you really do it?"

"It's a long story," hoarsely answered Electronic. "I'm in a hurry to get to the circus. What's your address? I like exact information."

"Well, if you want. . . ." May shrugged her shoulders. This Cheesekov thought a lot of himself. "It's 3 Geologists St., flat 15. The fourth entrance, fifth floor, and the lift works. Is that all?"

"That's all," said Electronic.

"So long!"

"So long!"

Sergei waved his hands in despair behind May's back, urging Electronic to continue the conversation. But the latter did not understand, just stood there like a post. The girl in blue was glad to get rid of this strange boy with his inquisitive ways. She walked

away without looking round, and even quickened her steps.

Sergei stared after her in dismay. . . . Why did he feel so unhappy? . . . There was a twinkle of blue for the last time, and it disappeared in the crowd. . . . May Svetlova, Geologists Street. Now he had her name and address. But nothing else. He did not even know how she felt towards him. . . . Electronic had behaved very strangely. As if made of wood. Not a smile, not even a joke or a funny story. You see, all girls like you to talk their heads off! What an odd fellow he was—Electronic! He spoke everything so correctly, but somehow it sounded rather silly. He was a good chum, of course, but just the same he seemed stupid in some things. . . .

“Well, let’s go to the circus,” he told Electronic, with a sigh.

### **HIPPOPOTAMUS CODE LANGUAGE**

CIRCUS—a blaze of light blinking on and off over the silver dome of a huge building. Higher yet, flashing bulbs brought to life flaming red horses, stamping their feet in impatience. And under all this electric radiance, the wide-open doors swallowed and swallowed a continual stream of people. But the crowd in the square was just as big: some were waiting for friends, some were trying to buy spare tickets from those going in, some were simply looking at the bright lights.

But Sergei and his friend had not got a second ticket. And Electronic had gone in long ago, leaving Sergei standing there, waiting. Bit by bit the crowd dispersed, and the jolly music began, loud and rollicking. It was getting emptier and colder in the square, and Sergei kept staring at the lights. Naturally he did not expect a bare-back rider or a clown to come outside and offer him a free ticket. But when the show ended and the noisy stream poured into the street, then Electronic would show up on the steps; and they would go home together.

He was lost in his thoughts, unaware that he was alone. Already



the street scavenger was busy cleaning up outside; the rustle of his broom searched for cigarette-stubs, pieces of paper, and even seemed to sweep up the odd bits of sound that escaped somehow from behind the closed entrance. But all the time Sergei was thinking about snarling tigers, spotted giraffes . . . and elephants whose sensitive trunks could turn the hands of a clock.

Somebody touched him on the shoulder.

"Well, well! So you want to see the circus?"

Beside Sergei stood a tall man in a long coat and rakish hat. He had shaggy eyebrows and sharp, observant eyes. Sergei shrugged, saying nothing—his unhappy state had no need of words.

"Come with me!" winked the stranger.

They went round a corner. The stranger flung open a glass door and shoved Sergei in ahead of him.

"Good evening, Anton Konstantinovich!" said the doorkeeper, getting up.

"Hello, Matveich!" answered Sergei's benefactor. "This boy's with me."

They climbed a narrow, spiralling staircase, came out in a hallway, and Anton spoke to an usherette:

"Masha, show him to a vacant seat." And to Sergei: "What's your name? Sergei? Well, good luck, Sergei. Enjoy yourself."

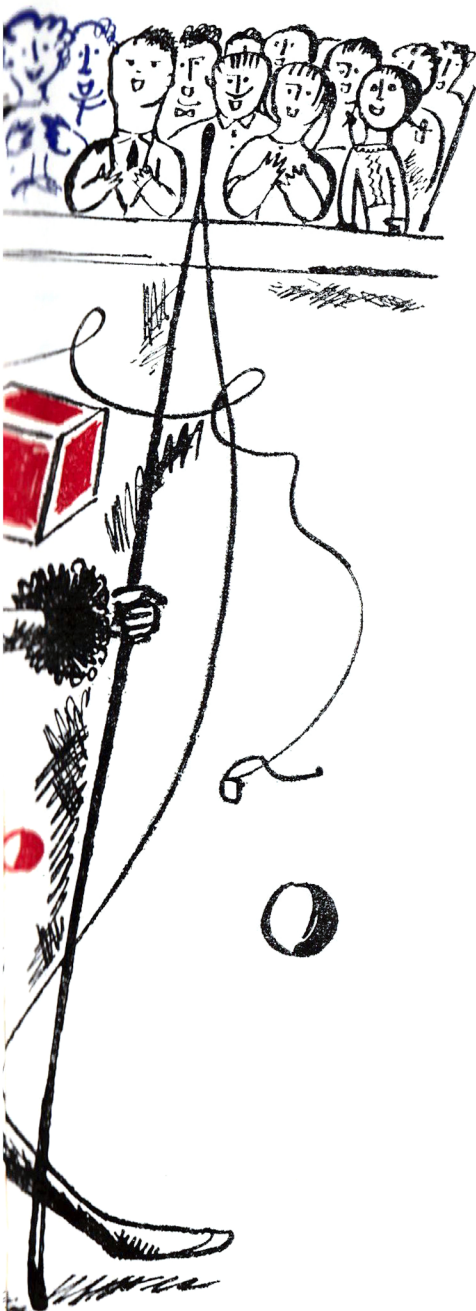
"Thanks," said the boy, flushing with happiness while his eyes followed the man walking away.

"You go up top," advised the usherette. "There's a seat in the last row."

Sergei flew up more stairs to the gallery, feeling the bouncy waves of music lapping against his chest as if he were wading in it. He was oblivious to how he got seated. His whole self was down there—in the shining arena—where balls, plates and rings were dancing like butterflies over a juggler's head. As though he himself were the juggler, tossing things, catching them, spinning them round, making sure not one fell.

Searchlights flashed on. The arena appeared to double in size. In the criss-cross beams, a rocket skimmed over the tiers of





seats; on it, two gymnasts motionless as statues, arms outstretched. And the rocket rose higher all the time, the music speeded up . . . now one gymnast hung head down while his partner, a girl, slipped off the rocket. Their hands met, palm sheathed to palm, and the girl swung under her partner as they circled the dome, casting racing shadows on the walls and roof. They performed death-defying stunts, now provoking deathly silence, now a vast sigh, now frenzied applause.

In the interval between the acts, the clowns entertained the public with their pranks; but Sergei's eyes searched for Electronic. For some reason, he was not where he was supposed to be in the tenth row. Nor the eleventh, nor the ninth. . . . Sergei noticed the violinist in the orchestra flipping over the music sheets, the conductor straightening his bow tie, the trumpet-player laughing at the clown's antics. But he could not find Electronic.

"The Wonderful Dream," called the Ringmaster, announcing the next act. "A mixed group of animals! The trainer: Anton Antonov!"

A lively march rang out, and a very odd fellow rode out on an undersized bicycle. He pedalled for all he was worth, and it was really funny to see him; but Sergei gave him only a passing glance. He turned his head this way and that, studying the rows of seats till the lights went down.

Suddenly a green light appeared and slid round the arena. Sergei stretched his neck to follow it. Moving along the velvet-padded barrier, which separated the arena from the audience, was a large seal. Black as black, as if polished with boot-blackening. Gently swaying from side to side, slithering along on his flippers, he was balancing a green light-bulb on the tip of his nose. Nor did he drop it.

Then he jumped down from the ringside barrier, flicking the bulb right into the hands of a uniformed attendant, and began poking his nose into Anton's side—he was fast asleep on the floor. The lights came on. Anton jumped up, apparently terrified at the strange polar scene before him: snowdrifts, ice-floes, and a real live seal. Astonished, Anton flopped down on an ice-floe, but it started to move. He sprang up in horror, as if scorched—it was no ice-floe, but a polar bear. Then he started checking the other ice-floes, and to everybody's delight, another polar bear was found. And a brown bear too: it crawled out from under an artificial-snow mat, found a bicycle, and started riding round the ring outside the snow-field. In the centre, the polar bears wrestled, turned somersaults, and rolled over and over like snowballs. They even stood on their front paws. The brown bear continued pedalling his bicycle, while Anton and the seal juggled balls to each other across the performing animals.

Suddenly, from somewhere in the audience came a deep growl. People turned their heads to see, and the brown bear brought his bicycle to a sharp stop. The growl was repeated. The brown bear listened, standing on his hind legs, and then climbed over the barrier while Anton, his trainer, just managed to grasp him by his collar chain. But the brown bear jerked away and bounded up





the steps, frightening the public. The trainer followed, appealing to him:

"Trofim, what d'you want? Did somebody call you? Pay no attention!"

Sergei's heart almost stopped . . . maybe Electronic had called the bear?

Trofim, puffing hard, reached the tenth row and stood beside a boy sitting on the aisle seat. The boy stood up.

"Electronic!" was on Sergei's lips, but he held it back. So Electronic was here, and all was well. But the next moment he became afraid: what if the professor, that Gromov, or maybe the militiaman were here in the circus? His fear flew away as quick as it came, for things were moving fast in the tenth row.

The trainer stared in surprise and then joyfully announced for all to hear:

"A-ah! So it's my friend, Sergei! Why are you spoiling my act, Sergei?"

"I'm not spoiling it," replied Electronic. "I just wanted to say 'hello' to Trofim."

A ripple of laughter rose from the onlookers.

"Well, get it over with!" Anton ordered. "Say 'hello' . . . and let's get on with the act!"

Electronic made a strange grunting sound, and Trofim did the same back. The bear rose to his full height and stretched out a mighty paw. The boy took the paw in both hands, whispered something in the bear's ear and gave him a sweet.

The audience broke into stormy applause.

"Fine, boy, fine," whispered the animal trainer, and led the unresisting bear away.

But now the seal was on his way up to Electronic, hopping on his flippers, carefully controlling his flexible, rubbery body: for he was balancing a huge ball on the tip of his nose. Afterwards, those sitting nearby claimed the boy made no sign to the seal, nor uttered a sound. They said the animal was simply acquainted with the boy and accustomed to playing with him.

But the trainer was really puzzled now. He did not know what to think, or do. Then an idea flashed into his mind: could the strange boy have called the seal by a signal not audible to others, an ultrasound beyond human hearing like the sound bats make? But he decided that could not be, no human could do it without a special instrument, a whistle, and the boy did not seem to have one. Clearly he did not know Electronic's possibilities.

The seal stopped, graciously curved his neck, and lobbed the ball to Electronic. He caught it smartly, and threw it back. So they played together till they drew applause. The shiny black juggler dropped down and chimed in, clapping his flippers. Then he flicked the ball up on his nose and returned to his trainer.

The act continued but Sergei's attention was divided. Now he would wave his hand to Electronic, and now cast a glance at the arena.

There, the scene had been changed again. Trees were in bloom on a green stretch of grass where a horned antelope was grazing. There were huge, rough, reddish-gray rocks and blue garden-pools. Long-legged herons stepped along, monkeys in short pants frisked and gambolled. And that weird Anton Antonov was again asleep. The herons stepped over him and pecked with their sharp beaks. The monkeys drew off his shoes, pulled a mouth-organ from his pocket and the hat from his head. The sad-looking antelope thoughtfully chewed his tie.

Anton jumped up to get his things back. But the monkeys, carrying the shoes, mouth-organ and hat, mounted the antelope and held on to its horns. They did not mean to be caught. . . . The antelope bounded around the ring. Anton stumbled over the stones, leaped over the pools, and could not catch the thieves.

Suddenly, crocodiles rose in the pools. With a great quaking and shaking the "stones" got up—and right in Anton's path stood two giant hippopotamuses, one dark gray, the other cinnamon. Opening the great red caves of their mouths, full of tusk-like teeth, they seemed to say: Just you try to get by. . . .

It was the boy in the tenth row, of course, who helped Anton out

of his difficulty. A sharp chattering sound rang out. The monkeys slid off the antelope's back and bounded towards the audience. Even the hippos closed their jaws in surprise.

The monkeys sat down on the steps and gibbered at Electronic, making gestures of despairing protest and chattering: "Ooh, ooh, oogy. . ."

"Ooh, ooh, ooh," hooted back Electronic, finishing off with a sharp: "Awk!"

The thieves threw down their loot and rushed back to the ring in panic. And how Sergei laughed! He almost fell out of his seat. But Electronic called out to Anton:

"Here's your things!" Bending over the people in front, he said: "Pass them along to him, if you don't mind."

The whole circus buzzed with excitement and the building shook from the loud applause. Out of the gallery came a ringing voice: "Hurrah! For the best animal trainer in the world—hurrah!"

Waiting till the noise grew quieter, Anton addressed Electronic from the arena:

"Sergei, perhaps you're a magician or something? Do you know animal language?"

"No," answered Electronic, as all listened attentively. "I'm not a magician. But I have studied animal signals a bit, and deciphered a few of their codes."

"Call out to the hippos!" someone called out from the audience.

"I don't know their code," admitted the boy.

For some reason everybody laughed.

But Anton decided to go on with his act, and cried:

"I'll try to do something with them."

He threw away his funny clothes, took off his long artificial nose, and stood—tall, muscled, supple—in a shining, tricot silk suit. A burst from the orchestra, and the antelope bounded in a circle, leaping over the hippos. The herons twirled in an intricate dance. The monkeys performed on swings in the trees. The crocodiles waddled, wearing muzzles. And the hippos lumbered along to a marching tune, lifting their clumsy short legs high and look-



ing distrustfully from beady eyes. Afterwards, Anton fed them a pile of green hay with a giant fork, and fearlessly put his head between their gaping jaws. Finally he turned somersaults on the backs of the enormous animals as they thundered round the ring.

To a spirited fanfare of trumpets, the animals sped out of the arena—the prong-horn antelope, the monkeys, herons and the lumbering cinnamon hippo. But the gray one was balky. He came to the ringside and began to open and close his jaws, as if yawning.

“Petie wants to go to bed,” explained the trainer; and begged the hippo: “Don’t keep the audience waiting, Petie. They’re tired too. You can’t sleep here. Come on!”

“Let him sleep here,” Electronic suggested, loudly.

But the hippo would not lie down, or go away either, no matter what his master said. He just yawned and yawned.

Then Electronic got up and headed for the ring. He went bravely up to the gray hulk, bending over to pick up a slender twig from the ground.

“Now Petie will sleep,” said Electronic. And, without anybody noticing except Anton, he lightly drew the twig across the hippo’s great stomach. Petite obediently lay down.

“So you noticed that . . .” whispered Anton to Electronic. But to himself: “The cunning rascal!”

The boy patted the animal on the side, and he got up.

“Now take a bow!” ordered Electronic.

And again it was only the trainer who noticed the thin twig tickle one erect ear. Anton had done the same himself earlier in the act.

Petie bowed his head and slowly backed away. Anton jumped on his back, and waved his hand in farewell to the audience. In a storm of applause, they disappeared behind the curtained entrance.

But the public did not want to leave, without seeing the famous artist and the hippo again. The orchestra brass blared. The Ring-master pointed to the curtains.

These parted, and two heads were stuck out. The hippo looked round indifferently. Anton nodded and blew kisses. But his eyes were serious and intent, all the time searching for a certain boy. He studied the arena, the exits, the rows of seats. . . . Without result.

### **CONVERSATIONS WITH A GOOSE AND A SERPENTONIAN**

They got home late from the circus. Sergei had a presentiment he would get a well-earned scolding at home, and could not think of a way to avoid such unpleasantness. Of course, his parents would not lay a finger on him, but they would throw the whole book of morals at him, for sure . . . all about good, obedient sons and how happy they made their parents. . . that all good boys were in bed by ten o'clock, and never stayed out after dark to cause their parents worry. . . . You would listen and listen, and stone after heavy stone of guilt was piled on your back, and you sagged and sagged under their weight, and could not get your breath. Only words . . . but a terrible burden. Hard to take. . . .

The boys had already gained the entrance of the apartment building, when suddenly this mountain of worry rolled off Sergei's shoulders. He had thought of something.

"Electronic, you never get excited," he began.

"Not often."

"And you could listen to a good jawing without minding it, couldn't you?"

"I think so."

"Then listen. . . ."

Sergei went into every detail of his plan. The main thing was to listen to everything in silence, without answering, and refuse supper by giving the excuse that you had a headache and wanted to go to bed.

"And I'll slip in afterwards. . . . I have my key."

Sergei pulled Electronic into the lift.

But the moment the door of the flat closed behind Electronic, Sergei realised he could not avoid hearing the "good jawing". He simply had to find out what was going on inside. However, it was less unpleasant to listen from behind the door than to stand, with hanging head, before his mother. He put his ear to the key-hole and this is what he heard:

*Mum:* Sergei, you mustn't do things like this. You knew Dad and I would be worried. You might have 'phoned. . . .

No answer.

*Mum:* Was it so hard to find a telephone at the circus? It's a good thing I thought of calling up Korolkov. Vova told me where you'd gone.

No answer.

*Mum:* And, generally speaking, why do I have to find out from other people what you're up to? I heard about your winning the race, about the great interest you take in mathematics, about the wonderful article in the wall newspaper. . . . But why didn't Dad or I know anything about all this?

No answer.

To tell the truth, Sergei had not expected the conversation to take such a turn. Now he regretted he had not gone in first. Oh, he could have really spread himself! He could have painted his success (or Electronic's rather) in such glowing colours his parents would have forgiven him any slips he might make for the next two weeks. But what a stupe that Electronic was . . . not to catch on! To let such a chance go by. . . . And Sergei even clawed at the door in his excitement.

*Mum:* Why do you stand there like that as though you're hiding something from me? Why don't you say something?

*Father (yelling from the bedroom):* He's too important now to talk to the likes of us.

*Mum:* Yes, so I see! Success has gone to his head. Come to supper.

*Electronic (hoarsely):* I don't want any, I ate five jam turnovers.

*Mum:* Why are you so hoarse? More likely you ate five lollies or Eskimos, and not turnovers!

*Electronic (very hoarse):* No, turnovers.

*Mum:* Where did you catch cold?

*Electronic (hoarser than ever):* I want to go to bed. I'm not sick. But I've got a headache.

"Better if you hadn't opened your mouth," said Cheesekov to himself, exasperated. "Or admitted you had ice-cream; then it would be quite plain—tonsillitis. But why did you have to remember about the headache? Nobody bothers, if it's an ordinary headache. But if you have a sore throat and a headache as well—it's sure to put parents on the alert. Now Mum will look down his throat, and she'll see it's not her son. . . ." From fear and excitement, the perfectly sound and healthy Sergei broke into a sweat and felt weak in the knees. . . .

*Mum (getting into a panic):* How cold your forehead is! Get into bed quickly! I'll bring a thick quilt!

*Father (coming into hallway):* And tomorrow morning—the doctor!

By now Sergei was so frightened that he walked back and forth on the stair landing for a half hour, or maybe an hour, before daring to go in. When he did open the door, his hand shook. He reached the bed and gave Electronic a little push. Then, with great care, he fixed him up in the wardrobe, locked it and hid the key under his pillow. Then he swore to himself he would never let Electronic explain anything, any more, to his parents.

In the morning, there was no need to call the doctor. Sergei got up early, made his bed, proved to his mother his throat was all right and even took his temperature. And, making up for lost time, he painted his victories in the brightest colours he could.

His father and mother left for work in a mood of elation. Their son's reticence had disappeared with his cold.

The moment the door closed behind them, Sergei opened the wardrobe door and greeted his friend:

"Hello! Have you still got a sore throat?"

"It's not sore."

His face devoid of emotion, Electronic came out of the wardrobe, holding a pile of books and the lamp in which the bulb had burnt out.

"I couldn't even read half of them," he complained. "Next time, leave me an extra bulb."

"If only I could, I'd give you a thousand high-power bulbs. You're the best animal trainer in the world!"

Now Sergei remembered in detail the flurry Electronic caused in the circus, and laughed with glee.

"Is something the matter with you?" asked Electronic in surprise.

"It was terrific when you frightened the monkeys yesterday! Electronic, what other animals or birds can you talk with?"

"Crows, geese, swallows, dolphins, lions, tigers, wolves..."

"Wow, is that something! That means the story of Mowgli—the way he lived in the jungle and understood all the animals, and was their friend and fought with the tiger, Shere Khan—wasn't made up! Could have happened, couldn't it?"

"Of course. It is possible to understand all animals, and then it's easy to manage them," confirmed Electronic. "The signal of 'danger' played on a tape-recorder chases crows from the fields. And dolphins will locate schools of fish for us, and ocean currents, too. And lions in forest reserves will come to dinner by radio signal. You just have to study animals, compare their signals with their actions, and then it's quite clear what the signals mean, what their message conveys."

"You've got a head on you, Electronic!" said Sergei with respect. "How did you ever think up all those things?"

"I didn't. The professor taught me. He is the greatest person I know, the best in all the world..." Strangely enough, the monotonous voice of Electronic held a solemn note.

But Sergei did not notice. He was too excited.

"Listen, Electronic, let's pretend... You be an animal trainer. And I... what shall I be? What would be the easiest language

for me to understand? I know, I'll be a goose! Honestly, I'll make a very smart goose. I know that bird pretty well."

Sergei flapped his arms like wings, slapped his bare feet on the floor and looked at his toes to see if they were webbed or not. Then he stretched out his neck and gave a terrible hiss-ss.

"Am I like one?" he cried.

"Honk, honk, honk," said Electronic.

"Wha-at?" asked Sergei.

"Honk, honk, honk, honk, honk," repeated Electronic.

The "goose" shrugged his shoulders, mystified.

"I didn't understand you."

"You don't have to talk," the trainer reminded him. "You have to carry out orders."

But the "goose" wore such a confused and puzzled look that the trainer stopped his honking and said:

"All right then. I'll decode the signals. Three honks mean: 'Hurry, hurry!' Five honks: 'We shan't stay here, let's move on.' Six honks: 'The grass in this field isn't too good, but one can eat it.' But seven honks in a row indicate the very best: 'Here's something really worth while!' Now, d'you understand?"

Sergei blinked rapidly.

"Of course. But just imagine—I always thought a goose was the most stupid bird of all—yakety-yak all the time and doing nothing. Then that means in the game we used to play—The Fox and the Geese—we sometimes talked like geese. Anyway, I'm too big to play it now." A sudden thought struck him, and he coughed, continuing loftily: "Electronic, we aren't children. It's our business to advance science. For example, let's count how many stars are in the sky!"

"They've already been counted," Electronic informed him, impassively. "Our galaxy, the Milky Way, has almost 150 billion stars."

Sergei shook his head, dubiously.

"I knew there were a lot, but never could remember the exact number. Once I read life really does exist on other planets where

conditions are similar to the Earth's, that there are even creatures of high intelligence."

"Some think there are several million planets like ours, but others think there aren't very many," Electronic corrected him.

"Here's what I keep thinking. Then why don't we receive any signals from other worlds?"

"Maybe it's because Earth is located too far from the centre of our galaxy," suggested Electronic.

"I know we are near the outer edge of the Milky Way," said Sergei, with a sweep of his arm. "But you see, our radio-telescopes have a range that extends to other galaxies. These are always on the alert, ready to receive. But no signals are ever picked up. Just as though we were forgotten."

"We simply don't attract anybody's attention," affirmed Electronic. "For instance, scientists living on a distant planet, in another galaxy, might imagine the Earth's atmosphere to be as hot as a billion degrees Centigrade. Why? The answer is simple: these scientists measure the temperature of the atmosphere according to the strength of the Earth's natural radio-waves. But we have many powerful TV broadcasting stations at work, which also give out very strong radio-waves. Right off, the newspapers of that far-off planet would report: Planet Earth is gradually breaking up because of high temperatures."

"Even if that were so," gloomily answered Cheesekov, "we ought to catch their signals all the same. But would you be able to decode them?"

"I could try."

"Of course you could do it!" Cheesekov had not the least doubt of Electronic's powers. "Come on. . . I'll send you secret signals from a distant planet, and you decode them."

"All right," said Electronic. "I'll try."

Sergei sprang into action. He sat Electronic on the chair at the desk, handing him a notebook and pencil. He opened the clothes closet, pulled out all the linen drawers. Coats, windbreakers, hats, freshly laundered sheets—all flew on the floor.

"Don't look!" shrieked Sergei, grabbing up different things, not knowing what to dress up in. "For now, you just concentrate! You see, you're just a simple, ordinary Earthman. And now, before you stands a Being from another world!"

And he really presented such an appearance to the "Earthman" that, if it were anybody else sitting there but the cool and composed Electronic, he might have been startled out of his wits. One could swear that his parents would not have recognised this strange creature as their son. He was wrapped in a sheet tied with a multi-coloured scarf, had on dark glasses, on his head a blue lampshade from the floor lamp, and across his cheeks were bright-red stripes of lipstick.

"Excellent," said Electronic. "You don't look like an Earthman. I'm ready."

"To begin with, let's choose the star system I live in," explained the resident of another world pompously. "It must sound good. The Great Bear? Andromeda? The Scorpion? But what would I be then? A Bearite, an Andromedian, a Scorpionite? No, I don't want to be any of those, I'll be. . . Hurrah! I've got it. I'll be a Serpentionian from a planet in the Serpent constellation!"

"Serpent! Serpent! This is Earth transmitting in the blind. Do you read me?" called the "Earthman", remembering his role.

"Wait. . . ." Sergei thought a moment, and snapped out: "Stand by one!"

He ran into the next room and knocked on the wall with his fist. To make sure the sound was loud and clear, he grabbed an iron urn off the table and began tapping out a series of dots and dashes.

"Decode it!" cried Sergei.

"That's too easy," said Electronic, entering the room. "'I'm a Serpentionian and send you warm greetings from the Great Serpent.' Morse code. That method has not been used in telegraphy for a long time. Can't you send your greetings in a more secret cipher?"

"I can't think of anything else," confessed the Serpentionian.





"Then it's not a bit interesting," rang the verdict of the Earthman.

"But how would I know what life is like on the Great Serpent!" cried Sergei indignantly. "Maybe trees move around the pastures and eat grass like cows. And the cows, in their turn, are rooted in the earth by their tails! How do I know whether Serpentionians have arms and legs, eyes and ears, or what they might tell us about themselves! . . . Oh, it's hot in this lampshade!"

The Serpentionian tore off his head-gear violently, and began to throw off the rest of his apparel. His position was complicated. And the Earthman seemed to understand how difficult it was to be a representative of another world.

"Don't be mad," he said. "Let's play it in reverse. Let's send our own signals from Earth."

"But do you know how to transmit them?" asked Sergei, cheering up.

"I know. Take this down! Now we'll set up a system."

Electronic walked up and down the room and reasoned aloud:

"We know by observation that the laws of physics and chemistry are the same anywhere in the universe. Therefore, mutual understanding between worlds is possible. To begin with, we send out a series of abstract signals."

"How do we send them? By radio?" asked Sergei.

"By light rays or by radio—it doesn't matter which. It's the principle of space communication that is important. Take this down! Two dots are greater than one dot. Three dots are less than four dots."

Sergei wrote:  $\dots > . ; \dots < \dots$

"Got it?" asked Electronic. "Now suppose, in the first case, we send two short flashes of light followed by a long flash and by a short flash. That way we have set up a system of mathematical signals. Then we'll change over to algebraic explanations. We'll broadcast variables, and acquaint them with abstract numbers, for example: 100 plus  $a$  is bigger than 10 plus  $a$ ." (Sergei wrote:  $100 + a > 10 + a$ .) Then we'll acquaint them with problems."

(Sergei scribbled:  $x + 10 = 111$ ;  $x = ?$ ;  $x = 101$ .) "We'll explain units of measuring Earth time. And so on."

"You're a genius!" breathed Cheesekov. "I never would have thought that mathematics could be a cosmic language. I guess I'll be a mathematician and programmer after all," he muttered to himself.

"But it wasn't me who thought this all up—scientists did," said Electronic. "It's called 'Ling-Cos' or 'cosmic linguistics'. Ling-Cos explains what man is, what he does, what scientific results he has attained. There may be other cosmic languages that I don't know about, but I expect you've noticed their underlying principle. All of them are based on mathematics, because it is understandable to all creatures of intelligence in the universe."

Sergei gave a sly smile, as he listened to all this. While Electronic was holding forth, he had thought up a very crafty question.

"Tell me, Electronic, can you possibly put your conversation of yesterday, with my Mum, into this Ling-Cos language?"

"Nothing easier," answered Electronic without hesitation. "Several persons may carry on a conversation in mathematical form, no matter what it is about. How to dial a telephone number, how to have supper, how to go to bed: they can all be put mathematically. Here, three persons take part. *A*—your Mum—sets the problem. *B*—that's me—always solves the problem correctly. *C*—that's you—always gets mixed up and gives the wrong answers. And so, *A* asks *C* to solve some problems: Why didn't you call me? Why don't you want supper? Why are you hoarse? *B* solves the problems correctly: I ate five turnovers, I want to go to bed, I'm not sick. But *A*—your Mum—says: That's bad! You see, she is asking *C*—that's you—and not *B*. In the morning, *C* gives the very same answers, and then *A* praises him: That's good! Here you clearly see the rule of politeness: NEVER answer a question which is meant for somebody else!"

"Ha-ha-ha-ha!" laughed Sergei. "You're a smart one. You know what's what all right. And I give you my word—I'll always speak with Mum myself."

Then Sergei wrote something on a sheet of paper, and folded it in half.

"Now read my opinion about one very important matter, while I go and wash off the lipstick."

And he ran to the bathroom.

Electronic opened the paper and read:

"Why should I search for people from other worlds, when a live Non-Human, my friend and my brother intellectually, is always right beside me?? His name is Electronic!!"

And under these lines Sergei had drawn two funny human figures, standing hand in hand.

"Thank you," said Electronic. "You're a real friend. I know that."

*Хорошо, это собаки не*  
**A GOOD THING DOGS DON'T TALK** *говорят*

"Theory is all very well," said Cheesekov, coming out of the bathroom, "but practice comes first. Since you're the best animal trainer in the world, let's make an experiment. I'll entice somebody's dog up here, and we'll talk to it. How d'you like that idea, Electronic?"

"Fine," stated Electronic simply. "Get the dog!"

Cheesekov dashed downstairs and looked round the courtyard. Naturally, not a dog in sight. That is, only Crazy Baloney, snoring under a blazing sun and warming his hairless flanks. Good thing he had thought of bringing along some bait. Outside of his own tail, this dog was practically indifferent to everything in the world. But he went crazy whenever he saw baloney (bologna sausage)—jumped, yelped, slobbered.... That was why nobody called him anything but Crazy Baloney. Only his master, the janitor, remembered his real name: Astra.

No trouble to lure Crazy Baloney into the lift, using his favourite tidbit, and then up to the eighth floor. He entered the flat readily enough, whining with impatience, not taking his eyes off the redolent sausage.

Then, unexpectedly, he began to growl and his hackles rose

straight up. How he barked! As if he were breaking a ten-year vow of silence: never in his life had he barked so furiously.

At first Sergei could not figure out what caused it. Then he caught on—the dog was darting at Electronic, trying to grab hold of his trouser-leg, leaping back each time in fear. Barking like crazy all the time, as if he wanted the neighbours to come rushing into the flat. Sergei threw the hunk of baloney on the floor, but it made no impression on the scandal-maker. He only behaved more and more like a lunatic.

Finally, Electronic, who had been calmly observing the excited dog, revealed a little of his skill. He began yapping, yelping, and made a few other strange noises. For a minute Crazy Baloney was silent, even sat down.

But suddenly he lifted his muzzle and let out a piercing and awesome howl. You would think somebody had just died in the house.

Shivers ran up Sergei's spine. He could not stand it any more. Opening the door, he pushed the frantic dog outside. Then he picked up the sausage and ran out on the landing to throw it after his late guest. So he would not raise a racket on the stairs.

"Oooh!" Cheesekov wiped the sweat from his face. "What a nut. . . . What d'you think was wrong with him?"

"He was afraid of me," quietly explained Electronic.

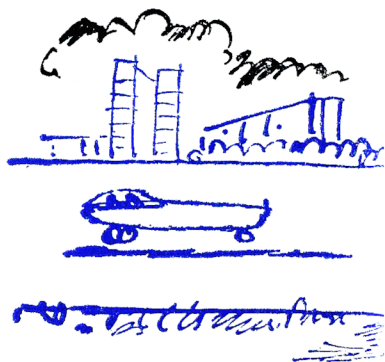
The experiment had failed. The mongrel had turned out to be more obstinate than wild animals.

"I always thought dogs were the most puzzling creatures!" said Cheesekov.

But to himself he decided the affair could be explained differently: Crazy Baloney had immediately sensed who or what Electronic was. And so, it appeared there was a third who knew their secret. A good thing he could not talk!

"That's enough nonsense!" said Cheesekov, resolutely, to Electronic. "Better get ready for school, and earn a few more Excels. And remember about the secret!"

The Secret  
Turns  
Burden









## AFTER ALL, I'M A HUMAN BEING!

A strange life began for Sergei. He was absolutely free—no lessons, no homework. Free as a bird, to fly wherever he wanted!

Every day Electronic brought home his Daily Report Book from school, marked with new Fives. Cheesekov's name appeared regularly in *Programmist-Optimist*. During lessons, the children waited only for that moment when Cheesekov got the floor, sure to surprise them.

Galina Ivanovna, form-mistress for 7B, frequently held Sergei up as a good example to follow: of late he had been so attentive, never whispering, never peeking at his neighbour's notebook, and never late. In a word, he was most industrious, and a model boy. Whenever the teacher was busy praising Electronic, Makar Gusev would turn round, wink and jerk at his collar, earning a rebuke from the teacher:

"Gusev, don't fidget!"

Nobody in the class, except Gusev and Electronic, understood the meaning of these little pantomimes. One day they had a scrap on the way home from school, in a near-by courtyard. As usual, Gusev started making fun of Cheesekov's name, twisting it every which way. What got into the usually peaceful Electronic, nobody knows—but he leaped onto the stone balustrade of a flight of steps, and the next moment Makar found himself suspended in air. The boys running past stopped dead, unable to believe their eyes. Some stranger, a rather slim fellow, was holding the noted husky, Makar Gusev, up in the air by his collar. And holding him without any effort, arm outstretched as if he were merely holding a naughty kitten. Makar was kicking his feet helplessly, making stuttery hissing noises that reminded you of a real goose. The boys laughed so much, they nearly split their sides.

Finally, Electronic slowly lowered his arm and deposited the bully in a heap on the steps. Three minutes passed before Makar was back to normal: never in his life had he been in such a terrible, incredible position.

"You . . . made of iron, Cheesekov?" he muttered, amazed. "Well, all right then. Let's make up, eh?" And he put out his hand.

"Right," agreed Electronic, and helped Makar up.

"I never thought you minded," grumbled Makar. "Can't take a joke. . . . All right, there won't be any more name calling!" He gave Electronic a friendly poke in the side, and shook his hand in pain. "Ow! Have you ever steel muscles! I've hurt my hand. . . . Say, let's forget about that telescope business, too. If you want to know, I looked through it myself, just before you did. I was almost blinded. . . . Hey you!" he cried out to the crowd of boys watching. "What are you waiting for? Haven't you ever seen a champion weight-lifter, doing some training? Well, come on, who wants a try?"

But no candidate could be found to try his strength against the champion's.

So peace was established, though Cheesekov—who supposedly was party to it—knew nothing about it. He noticed, naturally, that Makar was changed; but he figured it was entirely due to respect for his mathematical powers. Of course! Why, recently even the Professor had run to him for help: a problem in Physics. Sergei had looked at his friend with ironical eyes, and said:

"Look here, my dear Professor, d'you know how much knowledge is stored in a man's brain? A whole library of thirty thousand books! Do you mean to say you have less?"

"Stuck-up, aren't you?" replied the Professor, offended.

"You should train your memory," answered Cheesekov, and slammed the door. He was afraid the Professor might come in, and see Electronic.

"Say what you like," he thought, "it's terrific they know you can crack any problem, just like a nut. Even if they do think you're stuck-up."

Glory came to Cheesekov without any effort on his part. Actually, it did not "come" but flew, pranced in front of him on a

shiny black charger, trumpeting a fanfare announcing its approach. Glory dogged his footsteps like a shadow. The coach at the sports stadium rang the school and asked them to remind Cheesekov to sign up with their section, for sure.

Teachers greeted him pleasantly, even warmly; always had a good word for him. The pride of the whole school, Spartak Nede-lin, would call out in passing, or stop to chat with the seventh-former. Even absent-minded Victor Popov inquired whether he was keen on music. And Cheesekov was not slow in forgetting the door incident.

There were times he was simply feverish from all this fame, and his cheeks would burn. But he kept his dignity. If he got an unexpected question, he would answer with diplomacy: "I'll think it over. . . . I think so too. . . ." Or he would divert the conversation on to something else, repeating items he had picked up from *Electronic*. And Sergei was listened to with attention: the things he talked about were truly interesting.

"I've decided not to go in for light athletics—not enough time," Cheesekov told the gym instructor. "Then again, it is quite untrue that the people of long ago used to be stronger, or that the sciences are now weakening mankind. Recently, in one museum, they took various suits of armour the knights once wore, and tried them on people of average size: all the armour was too small! There you are, for all the talk about strong men in the old days; yes, and giants, too!"

The gym instructor could not, of course, agree that Cheesekov should not go in for athletics, and asked him to think it over. But he was pleased with the armour story: he had not heard of it, and inquired where Cheesekov had got it from.

"Read it in an English paper," said Sergei, "I forget which one."

Previously, Cheesekov had never imagined he could lie so glibly and with such inspiration. Not that he had lied about the armour. He really had read it in a newspaper, but not an English

one; in *Pionerskaya Pravda*. The thing is, it was not only this "English paper" that rolled off his tongue so easily. Cheesekov began to notice that sometimes he lied when there was absolutely no reason for it.

Once Taratar met him in the yard, stopped, and asked where he was going. Sergei said he was hurrying to shop for a complete set of works by the Bourbaki, the famous mathematicians, while in actual fact he was going to play volleyball.

And when he reached the volleyball court, he lied to the boys, telling them he had solved the difficult problem which Electronic was then working on at home. In short, Sergei had become a terrible liar.

But though his conscience held its peace for the time being, that did not mean Sergei's life was easy, or carefree either. Nobody would have suspected the torment he went through.

Late in the morning—after the school bell had rung and chalk and pens were scratching away in the classrooms, after parents were all at work—a furtive, hunched-up figure would creep out of the apartment entrance and hurry out of sight around the corner. The sun poured down such a flood of light that the spacious courtyard seemed terribly vast; the janitor watered the flowerbeds, trees and pavement with a long, snake-like hose; the sparrows chirped serenely in the bushes. Pulling his cap down to hide his face, darting stealthy glances round, Sergei would flee out of the yard. It seemed to him that hundreds, thousands of open windows stared straight at his receding back and screeched exultantly:

"Aha! There's the celebrated Cheesekov, hiding from all the world! Galina Ivanovna! Taratar Taratarich! Come and look out the window at this celebrity! Then maybe you'll realise it's not the real Cheesekov who sits at the desk beside the Professor! Fraud! Shame! Criminal!"

In such moments, Sergei felt he was a real criminal. The secret known only to Electronic and himself forced his head down between hunched shoulders, compelled him to watch carefully

all round, and aroused alarm in his heart. Terrible to think even about discovery.

Sergei examined everybody approaching him in the street, from a distance. . . . One of the fellows, maybe? Worse than that, a teacher? He would ask why Sergei was not in school. If the teacher had just ended a lesson and left Electronic seated in the classroom just five minutes before, what would he think when he saw a second Cheesekov, in the street?

Often he dodged aside and hid when he saw somebody coming, and then breathed a sigh of relief—imagination! Cheesekov had a special terror of militiamen, giving them a wide berth. He had read in the papers about Professor Gromov's lecture at the Cybernetics Conference. Speaking on self-teaching machines, he had said straight out: "To my regret, we cannot show you the original model now. It will be shown later."

That meant they were still searching for Electronic. No doubt the Militia Chief had called in his best men and given orders like this: "Find Electronic at any cost! Description: turned-up nose, blue windbreaker with electric cord under it. Marks for identification: Best magician, best animal trainer, best mathematician—in the whole world. Check all honour pupils in the schools. . . . What? Cheesekov, a sensation in the Cybernetics Vocational? Again that same Cheesekov we raved! He fooled us then, but it's all clear now. He's hiding Electronic in his home. Off with you, quick—look in his wardrobe!"

And then—good-bye Electronic, good-bye my best friend. . . .

No, he must try to keep it a secret. After all, how many remarkable things there were in this world, and all due to secrets!

There was the engineer, Smith, and his friends: castaways on a desert island who did not suspect that the all-powerful Captain Nemo lived right beside them. If they had known, and relied on his help, they could have built such a marvellous shelter in the cliff. And there would have been no need to grow a harvest from one seed or, in general, test their strength and ingenuity. Then there was Tom Sawyer and Huck Finn! Gaidar's Timur and

Sergei—the Drummer Boy! Wells' invisible man, Belayev's human amphibian. . . ." Yes, there were few famous heroes who did not value and respect a secret!

And just the same, his fear would not go away. It was a small, protesting and indigestible lump stuck somewhere inside him. Now it would seem to be melting away, dying out, had disappeared; but suddenly—a ring at the door or a shrill telephone buzz. And again everything in his stomach squeezed into a tight ball. Who was calling? What were they going to say? Why were they coming?

Another thing troubled him, too—the sudden discovery that he had a great yearning for mathematics. Amazing thing, the human being. Here he had only just got the chance to have a rest from all those formulas and problems, when suddenly he felt that what had tormented him before was now the most important thing in life. And at this time, when he was constantly tormented by fear and anxiety, Cheesekov sentenced himself to suffer new agonies. He firmly decided to be a mathematician, a programmer. Not an assembly man, or a physicist, or an astronomer, not even a magician or animal trainer—but a mathematician, a cybernetics scientist. He would know as much as Electronic; he would learn all the theories, theorems and formulas; the plane geometry of Euclid, the spherical geometry of the universe, the "Ling-Cos" language, celestial mechanics, and all the rest one had to know to be able to take charge of electronic computers.

But here he was, caught in a vicious circle. Sergei was ready to return to his desk, take up his pen, and make short work of *X* and *Y*. But he could not do it. He was hopelessly behind. If he risked returning to school, there would be a shower of Two's in place of praise and Five's! The disgrace at school would be nothing to the row they would raise at home. No, let Electronic finish out the term, and in the summer holidays he would catch up and go to school himself the first of September.

So day after day whirled by. Electronic won glory for Cheesekov, who loitered about in deserted by-streets, loafed beside the

river, or wandered along the most secluded paths in the park.

One day Sergei happened by the out-door stage where Electronic had done his magic tricks the first day they met. Though nobody was around, he first made a wide circle like a wary fox, and only then sat down on a bench. He recalled the girl's simple song:

*Balloons, balloons,  
My lovely blue balloons. . .*

It made him down-hearted, sad. How many times had he wanted to go to 3 Geologists Street, where May Svetlova lived, the girl in blue. He might meet her on the street, and say: "Forgive me, May. . . I'm not a wonderful magician, but simply Sergei. I found out your name and address by accident. And now I've come. . . ." How many times Sergei had wanted to say just that. But he had never gone. . . .

He sat on the bench, wrapped in gloom, waiting for school to be out. Then he could go home, to Electronic, and be himself again. To tell the truth, glory did not matter much. More fun playing ball, diving in the swimming pool, sending up tin rockets with the other kids. Somehow Electronic was not much good at ordinary things. Take the day before yesterday, for instance. The last lesson was cancelled, and the boys persuaded Electronic to play football. He was put in goal. But instead of saving goals, he had begun writing formulas on the goal-posts. After their keeper missed the third shot on goal, the team got mad and chased him off the field. It was lucky he, Sergei, was home and saw it all from the window. As soon as Electronic entered, Sergei ran down and out on the field. Oh, he was furious with Electronic! Then he shot five goals in a row! Would not do to let his football reputation suffer. . . .

Remembering this last, Sergei cheered up. He jumped up on the stage and made a speech, appealing to the empty seats:

"After all, I'm a human being! I have the right to give problems to a computer, test it, train it to do tiresome lessons and household

jobs. If the secret is discovered, and Electronic unmasked, everybody will understand. Who would do any different in my place? When all's said and done, I'm a human being!"

### WHAT DOES IT MEAN—TO THINK?

Taratar had a surprise for the children.

Coming into the classroom, they saw an odd little table with a TV screen on top, and a row of different coloured push-buttons below.

"What's that?" they cried out in chorus.

Taratar's big, brushy moustache twitched as he smiled. Waiting till all were seated, he explained:

"This is my assistant—a Teaching-Machine, or 'Trainer'. The higher forms made it—our programmers and assemblers. Especially for you!"

"But what is it? Why is it here? What's it for?" Questions came thick and fast.

"Please sit down, children, and I'll explain and demonstrate it. But to begin with, we'll have a little talk. . . . Who can tell me what it means—TO THINK?"

A forest of hands rose over the desks. How many times had Taratar seen their eyes start to glow and hands reach up automatically. It always made him a bit excited himself, though probably he seemed to others just as reserved as usual. Taratar looked round the room, and called on Dima Gorev, whose mouth was already open, impatiently waiting to begin.

"Well, to think," he began glibly, but soon hesitated. "It means . . . it means . . . to think. . . . To reason. . . . To pick out what's important. . . ."

"You've said all you can? Thank you, you may sit down. And what does that mean—to pick out the most important idea? You tell us your opinion, Kukushkina."

Hair flying, a girl jumped to her feet and rattled out:



"In my opinion, a clever person can always see what's important and what's not important!"

A light titter ran through the class, dying out as Taratar spoke again:

"I'm not asking these questions for nothing. They have a purpose. And though I've heard from only two of you, I believe many would have answered in the same way. The thing is, often a person does not realise HOW he thinks. And you see, it's really a complicated affair. To know—means to have an idea about objects, phenomena, and their relations. To think—is to be able to work with these. And the isolation of the main idea—the essential content of a lesson, a discussion or a certain principle—demands from you special skill and effort; but from us teachers—the knack of explaining and impressing it on your memory. We shall dwell more on this when we take up the computer." Taratar paused, thinking: "It's time to listen to the children." So he said: "But now, let's try to use our imaginations a bit. How does a poet write poetry? How does a composer create music? How does a scientist make a new discovery? In short, how are new images born, what causes the flow of creative thought?"

Taratar shook his head as he saw the forest of hands shoot up again, and added:

"I'll warn you beforehand: this is such a complex question that science still cannot provide a complete and exact answer to it. So don't be embarrassed. Any of your ideas may make a contribution to our discussion. So, if you please. . . ."

Kolya Grebeshkov, the class monitor, was as short and explicit as usual:

"I think the birth of new images is purely accidental. For example, Surikov happened to see a black crow on white snow, and painted his famous picture: 'Morozova, the Boyar's Wife.'"

"When you write poetry, you must use mountains of paper to find the right rhyme, to put your ideas into a form that is both concise and beautiful. . . ."

Even with eyes closed, you could guess it was Apenchenko talk-

ing—trying to speak expressively and hamming it up. Taratar knew that his friends had nicknamed the boy “Mushy”, because he was always writing notes to the girls during lessons. It looked as if Apenchenko wrote poetry too.

“... and then,” continued Apenchenko, “you have to check ... whether your similes or images are too trite, whether the rhyme has been used before. As a poet once said: ‘For every ounce of gold, a ton of dross.’”

“A ton of mushy notes,” someone could not keep back, and everybody smiled knowingly.

“New scientific discoveries always happen unexpectedly.” This was said by Vova Korolkov, the Professor. “You have to get away from the habitual viewpoint, and take a new look at any kind of phenomenon. That’s why they say that new discoveries are practically underfoot. Look hard enough, and you will see them.”

“But you could think your whole life through, and never invent anything,” came one objection. “Or invent a bicycle over again.”

“But of course!” cried Makar Gusev. “Everybody knows that it all depends on the imagination, fantasy. It all depends on how good a head you’ve got. . . .”

With that the discussion ended, and the usual uproar began. Taratar called for silence.

“I’ve enjoyed listening to you. All answers were good ones. To sum up, I’ll begin with the last remark: It depends on how good a head you’ve got. We pedagogues would like each pupil’s head to work perfectly. Is it possible to achieve this? Yes, it is. In school you get certain definite knowledge—information which sinks into your memory. With time, part of this information is forgotten, but it isn’t wasted, or discarded: it is stored away, one might say, in the basement of your memory, and its place is taken over by new information. And so, what is the creative process? Suppose you are thinking of creating a work of art or something new in science? You sit down and start thinking. Ideas come by fits and starts, first one, then another. This sends a call to your memory for information. Sometimes people say: ‘I can’t think,

no ideas seem to come,' and so on. But don't give up! Keep on jogging your memory—you see, you have a rich treasure house of all kinds of knowledge.”

“But if only foolish ideas come?” somebody asked.

“Why, sometimes they seem foolish, not what you wanted; but afterwards you discover they were exactly what you needed after all. The greater the variety of ideas, the more the analogies—they might even be from opposite branches of knowledge—the more interesting and surprising is the new image you finally create. You also mentioned accidental discoveries. It may look as though the birth of a new idea is pure chance. But it is not so. Discovery is governed by a fixed law of statistics. One only needs to search harder, study the problem from all angles. . . . And there . . . there it comes . . . the wonderful discovery. . . .”

Taratar adjusted his glasses and recited quietly, almost in a whisper, some lines from Pushkin:

*That flash of wonder I recall:  
Suddenly there you stood revealed,  
A transient vision to enthral,  
Angel of beauty unconcealed.*

It was as if some light breeze wafted into the classroom, breathing a faint coolness on expectant faces, fogging their eyes. Then it swirled away.

“Yes,” said Taratar, after a pause. “Only a few dozen, or a hundred, letters of the alphabet. A few lines. But a world of feeling in them, a world of emotion, of sadness. The poet makes his appeal to you, descendants far removed from his time, and you understand him.”

At this point, Electronic inserted something quite out of place:

“But the well-known mathematician, David Hilbert, said this about one of his students: ‘He has become a poet—he has too little imagination for the business of mathematics.’”

What a noise broke out then! They simply roared with laughter. As if they had all forgotten the poetic lines, as if no breeze of

emotion had touched them. Even Taratar's glasses danced on his nose.

"Well," he said, establishing silence. "You're also right. There is the opinion that mathematicians need the most powerful imaginations."

And Taratar began to tell them how the theory of probabilities—of chance—came into being, quite unexpectedly. In the seventeenth century, the scientists Blaise Pascal and Pierre Fermat decided to analyse dice games just for fun. And they discovered a series of "rules of chance". From their experiments they drew up a complex pattern of play, and this is even used in cybernetics today. Pascal and Fermat scarcely thought that their mathematical pastime would take such a serious place in science. And many other scientists of the past would be surprised if they knew that mathematics—in their time considered dull and divorced from the practical business of life—would be used in all fields of science and engineering.

"A few hundred years ago, all the mathematicians in the world could have been counted on your fingers," said Taratar. "Today, it's enough to look at you—to say that mathematics has become an ordinary, everyday profession."

This made them all quite proud, even conceited, for then the teacher began to talk about the unusual work of a mathematician. He had to picture up things he had never seen. For example, elementary particles. It might seem simple: before your eyes is a model of an atom with a round nucleus and electrons whirling round it in orbit. But who ever saw these electrons with the naked eye? Nobody! But scientists, though they could not see them, could describe them by using formulas and equations, making an exact and detailed analysis and constructing a mathematical picture. Thus do mathematicians create new ideas, and it demands the keenest imagination possible.

While speaking, Taratar had not once used his favourite question, although all the class had been expecting it. Finally it came, and quick smiles spread over their faces.

"Why am I telling you all this?" said the teacher. His favourite question was, as always, accented by a raised forefinger. "Well, this is why. Life around us is full of mysteries. We still don't know the world of Nature well. And we must discover more about it. Nature is always honest—you don't have to play cops and robbers with her. Nature does not lie. But she does not give up her secrets willingly either. So you have to be inquisitive, attentive, persistent and well-armed. Now we have sufficient knowledge to discover new things about Nature. We have powerful engineering equipment—electronic microscopes, cyclotrons, radio-telescopes, and electronic computers. Well, there's the bell," said Taratar in conclusion. "At the next lesson there'll be two teachers—the 'Trainer' and your obedient servant. . . ."

For years he had repeated those words—"your obedient servant"! Usually he was unaware of saying this. But today, for some reason, it struck Taratar that it was a bit old-fashioned. The years flew by, the upper forms finished school and left, new pupils came along, and always he was their obedient servant. He had taught for thirty-five years. He called the pupils to the blackboard, gave them marks, checked their control work, helped them with their school newspaper, took them on trips—such a lot of things a teacher had to do. He no sooner got accustomed to their wide eyes, became fond of them, than it was time to part. . . . And though afterwards he continued to run across them, chat and recall school life, every spring he felt an unaccountable sadness. . . . Another form leaving. . . . This one would go too, and then the telephone in his flat would ring more often. It rang day and night as it was: "Taratar Taratarich. . . . Oh, excuse me, I mean Simon Nikolayevich! A school habit. . . . This is Cheesekov. You used to teach me. . . . turned-up nose. . . . What, you really remember?"

"Yes," he meditated, "for some reason Cheesekov hasn't responded . . . he's been quiet all through the lesson. Aha, I know! He's waiting for a trickier question. Well, now, we'll have to think up a good one. . . ."

In the meantime, heated arguments were going on in the school corridor. Electronic, perhaps, was chattering more than all the rest—pouring out a fountain of figures, examples, facts. . . . If he had only known what doubts were tormenting his friend just then, skulking alone in the park. . . . If he had known how important it was for Sergei to be sitting at his desk, using his mind, thinking . . . like all the rest. . . .

### **DUEL WITH THE “TRAINER”**

There was a mysterious gleam on the pale metal surface and frosted TV screens of the “Trainer”—though it looked like an ordinary cabinet. Push one of the buttons, and it’s up to any kind of trick. At best, it gives you a surprise question in a loud voice, assigns time for answering, and probably flicks up a dreaded TWO. Or it may even get so annoyed with you, that it complains to the Headmaster. . . .

“Victor Smirnov, take a seat at the control panel!” Taratar invited the first victim.

An unusual silence reigned in the room. A desk lid squeaked. Smirnov slowly heaved himself up, went to the “Trainer” and sat down gingerly on the edge of the seat. Probably he felt little different from an astronaut, about to pull the switch controlling the ejection seat—to go flying out of the classroom into space!

“Press the ‘Start’ button,” said the teacher.

Here it is! Five red letters: START. Well, come what may, here goes! . . .

But he did not take off into space, nor was he accosted by a loud voice. A TV screen simply lit up and after a short time letters and figures appeared. The children fidgeted in their seats. What now?

“Smirnov has been given his problem,” explained Taratar. “It consists of simple simultaneous equations with two unknowns. Gusev, write them on the board, please.”

Makar Gusev was only too pleased. He ran up to the "Trainer", glanced at the screen, and chalked on the blackboard:

$$\begin{array}{l} 2x - 7y = 2 \\ 6x - 11y = 26 \end{array}$$

The teacher continued.

"Smirnov, have you familiarised yourself with the given equations?"

Smirnov nodded.

"Then push the button on the left. And the robot will give you instructions."

Smirnov pushed the button so quickly, you might think he had spent his lifetime waiting for these instructions. Another line of writing appeared on the screen under the equations: SOLVE THE EQUATION BY ELIMINATING X OR Y

"Let's find  $X$  first!" suggested Makar Gusev, feeling as if he were taking part in an important experiment.

" $X$  first," repeated Smirnov, hesitant.

"All right, find  $X$ ," agreed the teacher. "Push the button under  $X$ . The screen will show variants of the first stage in solving the problem. Think them over. Choose the one you think best and push the button corresponding to it. After that, the 'Trainer' will give you variants for the second stage. So you continue working until you have your solution, and the robot gives you your mark."

"Easy as pie!" commented Makar. "Start pushing, and I'll take it down."

Taratar, of course, noticed the spreading smiles of agreement. His glasses sparkled, and his black moustache quivered.

"Why did Gusev say that?" he asked, raising his forefinger, as usual. "Because he thinks pushing buttons is very simple. But we'll soon see what Gusev does when it's his turn to puzzle over the robot's variants. Some of them are right, others wrong. You can't cheat the 'Trainer'. And it marks your work fairly too. When your time is up—whether you've answered or not—it proceeds to the next question."

Makar Gusev scratched the back of his head. He could see, now, how nervous Smirnov was—puckering his brow, pushing back his hair, muttering something.

...Really, which variant was best? The long or the short? Probably the short. But there were two short ones, and in one there must be a mistake somewhere. Perhaps it was here, or maybe there? Check every plus and minus, multiply and divide. Only, must be quick . . . time's going. . . .

At this point Smirnov wiped his sweating forehead, and morosely pushed the last button. He beamed in surprise: a word flashed up on the tiny square screen that listed the mark: FOUR!

"A Four!" Makar announced to the class.

"That's fine," said Taratar, "though it might have been better. You chose a correct, but more complicated way of solving it. But it was only a small blunder, and we'll take it up later so that next time you use the shortest method. . . . And now Gusev will start pushing buttons."

To his surprise, Makar saw on the screen another equation. And he also wrinkled his brow, rolled his eyes, and pushed his nose almost into the screen.

Each one, in his turn, had his personal duel with the "Trainer". The click of buttons, the quiet buzz of the machine—ah's and oh's, and gleaming eyes of the pupils. It was exactly like an exciting, fascinating game. Nobody realised an ordinary lesson was going on. And when the teacher took the chalk and began explaining the mistakes, their excitement still did not subside. Each tried to find out where he had gone wrong. You see, when the game started with the "Trainer", nobody knew how it would turn out; and now each one had to figure out where he had tripped up so that next time he would be the winner.

"I've already mentioned," said Taratar, "that man needs a great deal of knowledge. But I don't at all want you to turn into encyclopaedias, information-bureaus or ordinary filing cabinets. Probably you remember one of the basic principles of cybernetics, as necessary to man as to computers: 'Whatever you do, the best



variant is the one that gets the most effective result.' I should like you to think in this way: 'If I use my brains, I'll be able to choose the best solution.' I hope the "Trainer" will help me teach you to do this." Taratar raised a warning hand. "By the way, the machine's programme for today has not been all used up. One problem is left over. A real hard nut to crack! And I suggest we ask today's assistant to solve it. Cheesekov has not had his chance yet."

Very dignified, Electronic took his place at the "Trainer". The children's sympathy went with him, as if he were a traveller setting off alone into the desert. The START button clicked, and Electronic read aloud, in an even voice:

"Find three different numbers to the fourth place: each number to be equal to the sum squared of the two numbers formed by the first two and the last two digits of the required number."

"Oho! That's a nut and a half! Well, someone thought up a doozer! The sum squared . . . formed by . . . digits of the required number. . . ."

So ran the thoughts of all the young mathematicians. One closed his eyes and pictured up a long column of numbers, which had to be gone through.

"But what was that? The buttons were chattering away like a machine-gun. Before three seconds were up, Cheesekov stood beside the "Trainer" and on the tiny screen shone his mark—FIVE!!

"Oooh," rolled a gasp from the front to the back row.

"The three required numbers," announced Cheesekov in his hoarse voice, "are: 2025, 3025, and 9801."

And he wrote on the board:

$$\begin{aligned} 2025 &= 45^2 = (20 + 25)^2 \\ 3025 &= 55^2 = (30 + 25)^2 \\ 9801 &= 99^2 = (98 + 01)^2 \end{aligned}$$

Desk tops banged, expressing the general admiration. Cheesekov took his seat. Even Taratar was surprised, and more than a little perplexed.

"Excellent, excellent..." he drawled. And could not find another word to say.

Somebody's tousled head poked through the door.

"The bell went long ago!" screeched a dancing-eyed imp, and ran off.

Taratar smiled. Just like thirty-five years ago, and it would be the same for the next hundred. There was always some mischievous imp who would yell: The bell's gone!

"That's all," he said happily. "As I've just been reminded, your time was up long ago."

The hero of the duel was surrounded by a tight ring of chatters, who accompanied him out of the classroom. Only Taratar was left, and the "Trainer".

Glasses gleaming, Taratar stared after Cheesekov. It seemed he really was perplexed about something. Suspicion?

### **IF ONLY THERE WERE A TIME MACHINE...**

Sergei was crossing the street when suddenly somebody yelled out:

"You, boy!"

A militiaman in summer uniform was beckoning.

Sergei stopped, cringed, and hung his head guiltily.

"Run for it?" he thought feverishly. "Too late! He's already coming.... In a minute he'll take my arm and say: 'Come on home, lad. Open your closet, and hand over ELECTRONIC!'"

A heavy hand fell on his shoulder.

"See here," said the militiaman, "you crossed the street between traffic lights. Next time, watch where you cross...."

Sergei opened his mouth, suddenly dry, and said nothing. The words seemed to float to him from somewhere far away ... words he had never expected: "crossed ... lights ... watch where you cross...."

"What are you waiting for?" asked the militiaman, slightly surprised. "Move along. And don't break traffic rules any more."

Sergei flew like the wind, his feet barely touching the ground. Where? He himself did not know. Only to put as much distance as possible between himself and that uniform.

"Was I lucky!" he crowed. "Either he didn't recognise me or else forgot his instructions. What a duffer! Let him look for me now. I won't be so easy to catch."

Cheesekov ended up in the very depths of the park and stretched out on the grass. Mighty aged trees surrounded a round, glassy pond. Its waters were clear and shining; only the edges were coated with a green rim of slime enlivened by the croaking of frogs. Not a soul around: no animals, no birds. Only him, Cheesekov, on the grass—and the frogs in the pond.

For some reason or another, Sergei began to feel sorry for himself.

"I live like a scared rabbit, afraid of everybody . . ." he mused sadly. "Is that living? Better go away somewhere—to the Far North, or to sea. Pack my things and leave home on the quiet. Electronic will keep going to school . . . keep my parents happy with good marks, sleep in my bed. . . . Everything will run smoothly there'll be no more trouble. A person disappears . . . extra baggage . . . nobody wanted him anyway. Only Mum will 'oh' and 'ah' because her son doesn't eat anything. But Electronic's pretty sharp, he'll think of some way to fool her. I'll go away for many long years," Sergei decided firmly. "And after, when I'm grown up, I'll come back and explain everything. Then they'll feel sorry and won't scold me."

A shrill whistling sound zoomed overhead, stabbing the earth. Sergei lifted his head. A shining, silver arrow with sharp nose and short, stubby wings pierced the blue sky like a needle. He would fly that way too, sometime, over his home: a quick glance down at the roof, yard and school—and be gone.

But then an angler came to fish in the pond. Without saying a word to the boy, he cast in his line and stood still as a stone, watching his float. As if he didn't know there's nothing here but frogs . . . came specially, to chase him, Sergei, away. . . . A fellow

can't be alone anywhere. . . . Not hiding his resentment, Sergei got up and moved off.

Dismally, he walked home, remembering the homeless dog he had seen only once, and so often pitied afterwards. He had a presentiment the same loneliness awaited him. . . . If they met again, maybe this time it wouldn't run away. . . .

And again his thoughts were broken off. This time by the sound of flying feet and loud cries. Rushing to meet him came a great hulk of a fellow, red-faced, clutching a large bunch of flowers. Two steps behind ran a fellow in a checked cap. Beyond that came a crowd of children, chasing hard after the first two, screaming: "Hold'em!"

Right away Sergei recognised the flowers. White roses from the school experimental garden for those who liked gardening as a hobby. The eleventh-form girls had worked hard to raise a new hybrid rose. A farewell gift for their teachers. Apparently these hooligans had destroyed the whole rose bush.

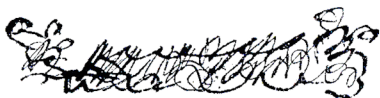
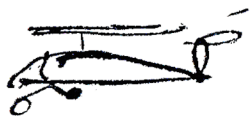
Cheesekov's face grew pale. He looked around—nobody near. But the big fellow was running straight at him: Sergei could even hear his breath rasping and whistling like a train engine. Seeing Cheesekov's raised fists and pale, determined face, the fellow dodged aside and hurtled past. But Sergei managed to stick out his foot and trip up the one in the checked cap, who landed spread-eagled on the pavement.

During the minute that followed, everything around Cheesekov was in confusion. The fellow in the cap jumped up and threw himself at Cheesekov as on an enemy, catching him in a grip of iron.

"Aha, caught you!" the fellow screeched, unexpectedly. "Fellows, I've caught one of them."

To his horror, Cheesekov recognised the school boxing champion, Medvedev. What had he done! Tripped him up! And all because of a stupid cap that hid his face. Impossible to know who it was.

The rest pounded up and began shouting:



"Hang on tight! Don't let him go! We'll question him later. . . ."  
And suddenly a deep voice:

"But he's in our form! It's Cheesekov!"

His unexpected rescuer was Makar Gusev. Red from the hunt and terribly angry, like the others, Makar ground out at Sergei:

"You crazy or something? Who did you think he was? Tripping him!"

"I thought he was the thief," said Cheesekov dolefully. "I couldn't see his face. . . . Let me go!" he begged Medvedev.

But the latter only glared at him, not loosening his iron grip.

Meantime, the hulking thief with the precious roses seemed to have gone through the earth. Perplexed, everybody looked round the deserted street. In the turmoil, nobody had noticed which way the thief went. And now Cheesekov finally broke away from the boxer and cried out:

"He went in that doorway! I saw him!" And Sergei darted towards the door, happy to hear a rush of feet behind him.

Stairs, stairs, endless stairs. . . . Sergei ran very fast, but others outstripped him; again hot breath behind, and more passed by. Now they were all together in a bunch; his friends were tearing upstairs as fast as they could. But what if he had made a mistake? Then what?

No. No mistake. That was Medvedev's voice bellowing:

"Stop! Don't beat him! Watch the flowers! . . ."

Sounds of struggle, grunting, clouds of dust falling down. Plainly the thief was putting up a good fight. All at once everything was quiet. Past Cheesekov standing on the landing, they led the captive down. A sorry sight—pale, covered with dirt.

Then Medvedev came down, limping; Gusev carrying his cap. Medvedev saw Cheesekov, and his eyes flashed.

"Here!" And he held out a few crumpled stems, all that was left of the roses.

"Some chump you are," Sergei told himself. "Couldn't even save the flowers. . . . And now in school they'll all ask me how I could have tripped up our own fellow. . . . But that's the least of

my worries. . . . If they learn about Electronic, about the fraud. . . .” Sergei shivered. “No, got to make up my mind. I’ll have to disappear!”

And immediately Sergei felt at peace with himself. Reaching home, he lay down on the couch, and began thinking of the future. Tomorrow he would get on the train and go to Murmansk. He had a friend there, Serafim Malikov—they had got to know each other at a Pioneer camp on the Black Sea. He could live with his friend until the Department of Northern Affairs found him a job. “I’m an orphan,” he would say. “All alone in the world. A born lover of the North. All winter I go without a hat. I’ll do any kind of work. If I have to take a course of training—I can.” I could phone Serafim right now. I can dial Murmansk direct from home. No, it would be better not to ring up first, but arrive unexpectedly, and avoid questions.

Sergei went to the telephone and rang up the Inquiry Bureau at the railway station.

“Would you mind telling me when the next train leaves for Murmansk?”

“The Moscow-Murmansk train, No. 16, leaves tomorrow from Track 3 at 12.05,” the Automatic Exchange answered with a nasal twang, sounding like the station loudspeaker announcing train departures.

“Are there tickets available for tomorrow?”

“Yes. Do you want one reserved? Upper or lower berth?”

Too late to retreat now. And Sergei said firmly:

“Yes, please. Upper!”

“I shall register it.”

Inquiry had transferred Sergei’s call to the Registry Desk, also automatically controlled, and an impassive voice repeated:

“One ticket in the name of Sergei Pavlovich Cheesekov. You may pick it up at the Registry Desk any time up to half an hour before departure.”

So that was that. Good thing it was not a clerk; he might have

become curious: "And how old are you?... But are you certain you're leaving?" And other stupid questions.

Lucky for him his parents were away in an overnight rest home and would return only tomorrow after work. That would give him time to give Electronic exact instructions as to how to behave with his parents. Recently his father and mother had become rather suspicious. Mum, for instance, had once remarked: "Sergei, didn't you hear when I called out to you, on the street? Why did you run off? And how is it you were wearing the blue windbreaker I sent in to the laundry?" Such hard-to-explain "why's" were beginning to mount up. "Where has the key to the wardrobe got to? Do we have to break the lock now? Why does the frig transformer keep disappearing? Everything is always swimming in water.... Why does Sergei talk to himself at night? Why does he spend all his evenings on the street and come home after we're all asleep?" And so on, and on.

And Taratar had rung up more than once to talk about the Bourbaki set of books which Sergei had lied about, saying he wanted to come over some time and discuss various mathematical problems. Sergei had been very enthusiastic:

"Why, of course. I'll be very glad to see you."

Hanging up the receiver, he had been really dismayed. . . . That was all he needed. . . .

Electronic showed up unusually late, close to evening almost; and at once sat down to do homework. Sergei did not ask where he had been.

Returning to his parents' room, he collapsed on the couch and stared at the ceiling. From time to time he was aware that the door opened a bit, and Electronic would look in. As if waiting to be questioned. Or perhaps Electronic felt guilty, for keeping him waiting so long? But it made no difference anyway.

Finally Electronic came to make his report:

"Homework's all done. I work the problems out quickly, but writing them is slow work."

"Fine," answered Sergei indifferently.



"I sat in the isolation-chamber."

"In the basement?" asked Cheesekov, idly interested.

"In the basement."

Cheesekov knew this trick of old. When the kids played at being astronauts, they took turns being locked up in what they termed the "isolation-chamber", where no light or sound got in from the outside world. In other words, in the basement root-cellar. To train their will-power. It was so dark that after sitting there for an hour with open eyes you still saw nothing. And there was absolutely no sound, except for the mice that ran past occasionally. Kids with weak nerves could not stand it; they would drum on the heavy iron door to be let out. And they were let out of the cellar, and out of the game too. But whoever sat there more than half an hour, on seeing daylight again, would stagger all over the courtyard as if drunk—unable to see a thing for a while.

"How long did you sit there?"

"Three hours," said Electronic. "I beat everybody at it."

They were silent.

"Are you sick?" asked Electronic.

"No, I'm fine."

"What are you thinking about?"

"You know, Electronic, you sound just like my parents: 'Are you sick?... What are you thinking about?'... I'm thinking of inventing a Time Machine."

Cheesekov expected Electronic to say: "A waste of time. Not possible, not any kind of Time Machine." And leave off asking questions. But Electronic quietly remarked:

"There soon will be such a machine."

"Pure fiction," said Cheesekov, with an airy wave of assurance.

"No, it's not fiction. And it will take you into the future."

"And into the past, too?" Cheesekov was more interested in the past. Then he might be switched back in time, by two weeks; and begin everything from the beginning. . . .

"You can't go into the past, ever. You see, it's an ultra-speed space-ship."

"A-ah . . . a space-ship. . . But that's not a Time Machine."

"Yes, it is." Electronic spoke with confidence, as if he were explaining a well-known time-proven theorem. "When a space-ship is moving close to the speed of light, time for the crew passes slower than on Earth. Let's suppose some astronauts fly to the centre of the Milky Way. During the flight they would age only by 12 years, but 20,000 years would have gone by on Earth. Two hundred centuries."

Cheesekov whistled, and raised himself on his elbow.

"And you're not piling it on?"

"What's that—'piling it on'?" asked Electronic. "I've heard it before several times, but I don't understand what it means."

"That, Electronic, is one of the most common expressions. 'Piling it on' means to exaggerate or lie. Well, not exactly to lie, but to tell something as if it were really true, when it isn't."

"When I speak, I always give exact and verified information," said Electronic, speaking as usual without intonation. "The slowing down of time during ultra-speed flight was predicted by the great physicist, Einstein. And it has since been proven correct."

"But Electronic, I didn't mean that. . . . You don't quite understand. . ." Sergei began, apologetically, as if his friend might think he was accusing him of lying. "I only wanted to say that that's a lot of centuries to go by on Earth. When the astronauts returned, all the people they knew would have died long, long before. Couldn't I make a flight that would last about five Earth years?"

"You could."

Cheesekov began to imagine himself returning from a flight in space. All his sins would be forgotten, and he could begin a new life. He would go to school, tell everyone about his adventures, and just be friends with Electronic without making him go to school for him, Sergei. Electronic would only need to give him hints on how to work out the most difficult problems. . . . Only at present there were no ultra-speed space-ships . . . hardly. . . . He had not heard of any, at least.

Electronic confirmed his doubts.

"So that's that," was all Cheesekov could say, meaning: Why talk about such things if there aren't any!

Their last evening was spent talking about practical matters. They drew up a detailed schedule of the life Electronic was to lead for the next two to three months. Sergei decided not to tell his friend that he was going away for many years. What was the good? Electronic would not agree! But he would not mind two or three months. He was already used to being Cheesekov.

So for a long time, Sergei told Electronic the story of his life, everything that he could remember at least. Electronic gathered a fairly complete and clear picture about the person he was to represent from that night on. The life story of Sergei Pavlovich Cheesekov was so successfully engraved upon his memory that he could describe in detail any episode—relating it, naturally, in the first person.

"May I be broken if I give away the secret!"—this oath was not only to be kept, now it was for life. From now on, Electronic must forget who he really was. Forget forever.

The would-be runaway tossed in his bed till dawn, and then dozed a bit. When he opened his eyes, Electronic was gone. . . . No, there was no more Electronic! It was Cheesekov who was no longer in the room. Sergei Cheesekov, of the Seventh Form, Cybernetics Vocational, had left for the Pioneer Palace. Today was Quiz Day, and members of the Academy of Sciences gave scientific talks. In short, a usual school affair. But here, in the flat on Linden Avenue, was someone who used to be called Cheesekov.

It occurred to Sergei for the first time: "But who am I then? Strange! For the present, I'm nobody. I still haven't thought up a name for myself." For a minute or two, though, he decided to be himself again. For a few, very important, minutes.

He sat down at the telephone and, dialing Information, got the telephone number of flat 15 at 3 Geologists Street. He dialed the number.

"May I speak to May, please?"

But they did not understand him:

"Hello! Hello! What did you say?"

He repeated his request:

"May, if you don't mind."

A sharp buzz. . . . "They hung up . . . why on earth?"

Sergei rang again, and this time they heard him. A pleasant, deep voice answered:

"Just a moment."

A moment. Now she was coming to the telephone in her blue dress, wondering: Who can it be?

"Hello!"

"Hello, May!"

"Hello! Who's calling?"

"Sergei," he said, hollowly.

"Which Sergei?"

"Cheesekov."

"Oh! Hello, Sergei!"

He was happy and sad, both at the same time.

"I'm going away," he said.

"Very far?"

"Murmansk."

"On tour? With the circus?"

"Not exactly. I'm not what you think I am. I'm not a magician."

"But of course," said May. "Naturally, you go to school."

"Yes, Cybernetics Vocational, Seventh Form. And you?"

"I'm in the Seventh, too. School of Chemistry."

"Interesting science," Sergei blurted out without thinking, immediately angry: he hated Chemistry.

"And I don't like it at all—just imagine! Next year I want to change, go somewhere else," confessed May.

"Well, on the whole, it's not such a . . ." mumbled Sergei like an idiot, and suddenly became cheerful. "Then come to ours! No, I'm serious. You know, we. . . ." He broke off abruptly, falling

silent. "But you've never really seen me, ever. I just wanted to say good-bye."

"I don't understand," said May. "Aren't you even going to Quiz Day?"

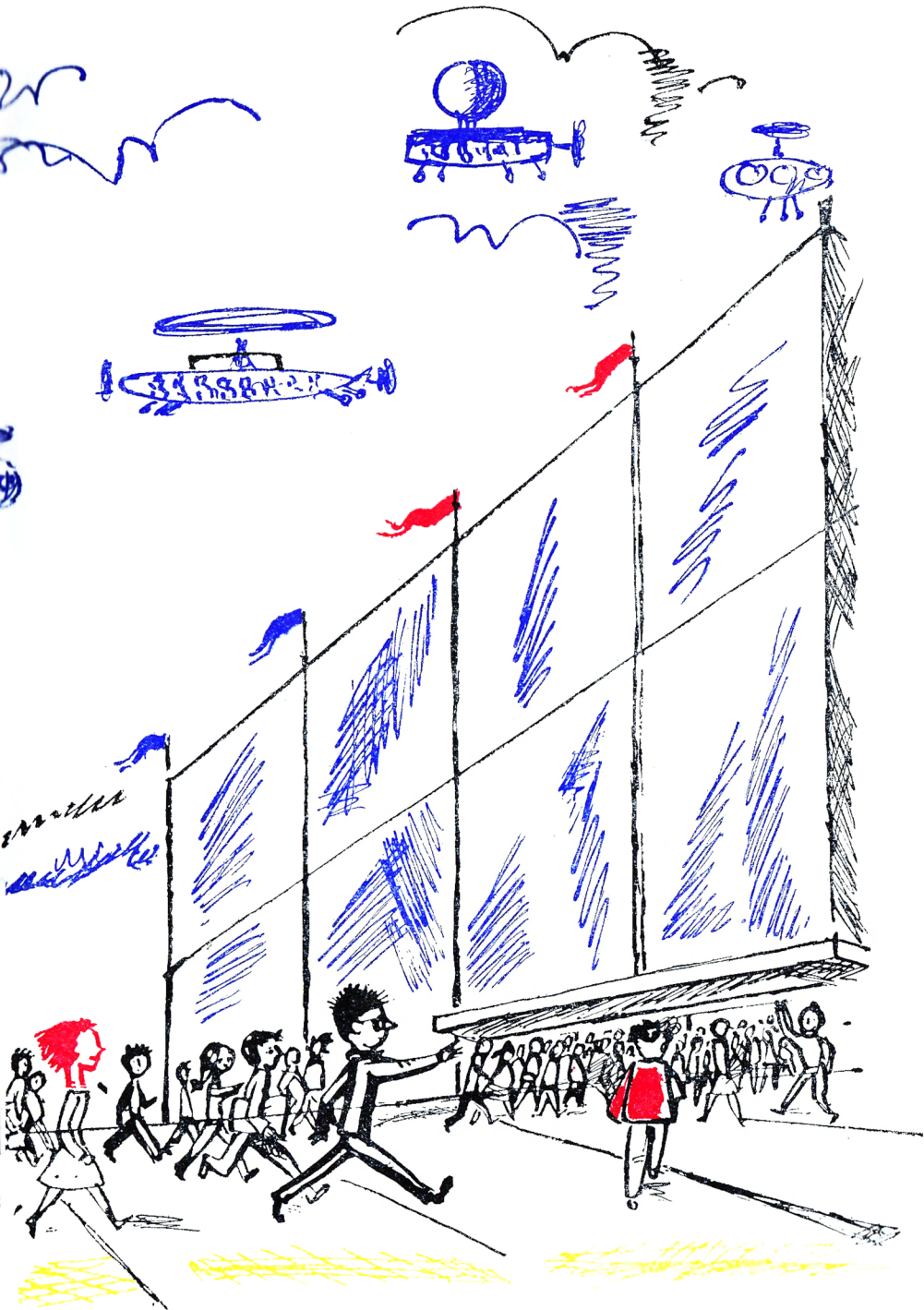
"I don't know. . . ."

"I don't understand," repeated May. "Sergei, if you're not joking and want to say good-bye, then come to the Quiz Day programme."

. . . Three hours . . . to train time. And in this time he had to make a decision. For him—the most difficult decision of his life.

Men  
at the Helm









## QUIZ DAY

Any schoolboy or girl, living on Linden Avenue, or in the neighbourhood, would be glad to explain Quiz Day.

"It's a special day. First, we don't have any lessons. Second, we may ask questions—anything at all. And third, very distinguished people answer them. Only it's a shame Quiz Day comes but four times a year—the first Saturday in every third month. You wait, and wait—it's terrible, waiting!"

To this, one might add that in all the schools brightly coloured Quiz Boxes were on display. Boxes marked with huge question marks: the children slipped their questions in them. Hundreds of "why's" and "how's" and "what for's". Waiting their turn to be brought up on Question and Answer Day, as they called it officially, that unusual Saturday. But the children christened it anew, and everybody, even the teachers, now called it Quiz Day.

Now it had come round, as always, after three months. The schoolchildren, in crowds, and more crowds, hurried to the Pioneer Palace, colourfully decorated with mosaic pictures, flashing in the sun: a Pioneer bugle and drum, a Sputnik, a geographical globe, star maps of the universe. Inside, beyond the glass doors, the guests were greeted by two "Martian" electronic robots. The Pioneers called them Martians because of their blue-gray bodies on three, stilt-like legs; and the oval TV screens which reminded them of spacemen in hermetic helmets with antennas like long whiskers. On their chests were telephone dials. Go up, dial a number which you choose from a Question List, and a pleasant voice explains to you what a photon is, how the trajectory for a flight to the Moon is charted, what the population of the Earth is, and so on; while the TV shows diagrams or film shorts to explain more fully.

The "Martians" were always there to answer questions. But today nobody bothered to hang around or dial numbers. The crowd poured into the large auditorium where scientists, engineers

and writers were sitting behind a long table on the stage, waiting. They were all brilliant celebrities.

Professor Neznamov, gray-haired, face etched with deep lines, arose to open the meeting. He was a member of the Academy of Sciences. It was not the first time he had been chairman, but all the same, before beginning, his glance moved carefully over the rows of seats, noting the hundreds of eyes—happy and attentive, mischievous and thoughtful, narrowed with amusement, wide with wonder. To those near him on the platform, the deep-cut lines seemed to smooth out and his face lit up. He gave a slight cough, and suddenly asked:

“I’d like you to tell me if anyone here thinks that all possible scientific discoveries have been made. Have we gone as far as we can? Those who do think so, raise your hands!”

A clamour of surprise was their answer. Not a hand shot up. Neznamov smiled.

“Thank you, my friends. Now, with your permission, we’ll begin. When my colleagues and I looked over your questions, we were reminded of an amusing story. In one country, a century ago, a boy started school. After a short time, the teacher came to see his parents. She was very polite, but her meaning was clear: ‘It’s not very pleasant for me to say this, but I’m afraid your son is such a fool there is no sense continuing his education.’ Naturally, his parents were terribly disappointed. However, they followed the teacher’s advice and took their son out of school. This boy . . .” he made a significant pause, “was Thomas A. Edison.”

The burst of laughter that followed threatened the roof; then silence—what was coming next?

“So you see,” and the scientist’s eyes narrowed with sly amusement, “on reading your questions, we wondered what that same teacher would have said about them. Almost certainly she would have cried: ‘Good heavens, what a lot of stupid questions! Not one that shows brains.’” Neznamov paused again, and his conclusion was unexpected: “Good for you, children! Keep up the good work, and put your heart into it!”

... How they laughed, these big-eyed boys and girls! If you joked with them all day, they would never tire of it. His thought ran on: what if their laughter could be made visible? For example, if he could catch it in a mirror and reflect from it sun-rabbits, as the children called them. Then hundreds, thousands of golden reflections would spread through the auditorium, jump out the windows and doors, dance and do somersaults through the streets, infecting all the passers-by with happiness.

"We will now turn to the questions," he said aloud, in a business-like tone. And all eyes, centred on him, were again attentive. "There were very many, all of them interesting and calling for serious thought. And so we divided the questions into groups, sending them to specialists in different fields of science, industry, art and literature. We were glad to have so many questions. I had good reason to ask in the beginning whether we know everything about Nature, whether anyone thought that all scientific discoveries had been made. Your eloquent silence and your questions prove how out of date is that old scepticism—"There's nothing new under the sun.'"

Now the chairman began to read aloud some of the questions handed in.

"I heard,'" he was reading the question of a seventh-former, Yuri Bobrov, "that the leg of an ordinary chair contains as much energy as is supplied by the Bratsk Hydro-Electric Station over a period of several years. Is it true or not?"

The second question was from School No. 3: "Can we turn the Moon into an electric power station for Earth, so that it will collect heat from the sun and transfer it to us in the form of electricity? You see the sun, every  $2\frac{1}{2}$  minutes, sends the same amount of heat to Earth as would be required to bring to a boil all the water in Lake Sevan."

"Let us call on the well-known member of the Academy of Sciences, Peter Ivanovich Somov, to tell us about important problems in physics and power engineering: about thermo-nuclear reactions, about transferring the sun's heat into electricity, and

about other prospective power sources." Neznamov continued: "Together we shall discuss how mankind, using our gigantic oceans of electric power, will be able to change climatic conditions so as to obtain rich harvests the year round; and how man will settle other planets."

The chairman mentioned a few other questions, meant for physicians.

"Is it possible to put a person into a deep sleep or freeze him to a condition of hibernation during a long flight in space?"

"Is it true that an astronaut only needs a two-hour sleep (instead of eight) when he is in a condition of weightlessness?"

"How can man's life-span be lengthened?"

Questions to writers of science-fiction:

"How do you think up things that are not even predicted by science?"

"How did Jules Verne work?"

Addressed to physicists:

"What would an 'Artificial Nose' apparatus with a sense of smell look like? Is it possible to invent a sensory-telescope that would bring us aromas or smells from other planets?"

"I shan't read out all the questions turned in," continued Neznamov. "However, I'd like to observe that among them were very many questions on cybernetics. And, though many of you sitting here are future physicists and chemists, engineers and doctors, pedagogues and biologists, I'd like to remind you about the origin of the word 'Cybernetics': the Greek word 'kybernétés'—which you find in the philosophy of Plato, by the way—translated, means, steersman—a person who steers a ship, the man at the helm. It is a very well-chosen image and, in my opinion, it may be applied not only to cyberneticists—but to all of you.

"Let's imagine a great ship is setting out on a long voyage. Thousands of people are engaged in fitting it out and getting it ready for sea. A farewell salute of the cannon, and the ship sets sail. A difficult voyage lies ahead—thousands of miles, undiscovered lands, unknown mysteries of Nature. The fortunes of this

ship rest with the captain and crew, from the cabin-boy up. The helmsman will be changed every watch, there will be gales and storms, and certainly the joyous hail from the crow's nest: 'Land-ho!' To me, modern science is like that ship. And each of you will take your place at the helm, because the questions, projects, and hypotheses discussed today will be the heritage scientists leave to you. You will stand a new watch. And you will sail on!"

While the chairman smilingly waved aside the applause, electric bulbs lit up over the stage. They formed the first group of questions:

WHAT KIND OF COMPUTERS ARE IN PRACTICAL USE TODAY?

WHAT PROBLEMS ARE WITHIN THE POWER OF ELECTRONIC COMPUTERS TO SOLVE?

CYBERNETICS—IS IT THE SCIENCE OF SCIENCES?

"These questions," said the chairman, "will be answered by Ivan Alexandrovich Glushkov, engineer, and Alexander Sergeyevich Svetlovidov, Master of Science."

Curtains swept open at the back of the stage revealing, against a dark background, five frosty TV screens: a large one in the centre, and two smaller ones on each side. The screens lit up simultaneously and, though the sun streamed through the windows as before, the cineramic colour TV showed up sharp and clear.

Each screen ran a separate film. But this did not distract the attentive audience from following all the "Brain" machines or listening to Glushkov's explanations. On the contrary, the various film shorts seemed to create a combined picture of the world of electronic computer-helpers of mankind.

... Here were red-hot, long iron beams giving off a blinding light. Now they were being fed into the rolling-mill, coming out in thin iron sheets. And all processes controlled by a "filing-cabinet" computer. ... There on the steppe stretched hundreds of oil derricks. Electronic controllers pumped the oil through the pipelines. ... Trains raced along the rails, trolley-buses and electric motor buses moved along the streets—all run by robots. ...

An artificial electric heart replaced the patient's during an operation, saving his life. . . . One of the neighbouring screens showed a different computer—it was checking a collection of rock samples fed it by geologists, and indicating where to search for coal, oil, diamonds. . . .

Suddenly life on Earth disappeared from the screen, and you were in the deep abyss of space. Black, silent space, brilliant fiery stars, and one swiftly flying dot. This came speeding towards the audience, growing larger before their eyes, finally becoming a space-ship. Like looking through a house window, so you looked through the round porthole, and you were there—in the cabin. The astronaut smiles behind the mask of his helmet: he feels fine! Electronic machines record his physical condition, reactions, pulse—and radio the information back to Earth. On a lower screen, you see the Operations Centre where computers control and correct the trajectory. So that the Commander may continue to smile and make split-second decisions, the Electronic Brain must sense any danger and flash a warning signal to the astronaut. The space-ship must fly exactly according to plan. The Electronic Brain is the cosmic navigator: he answers for the man's life.

Again back to prosaic Earth. Computers which design ships, lathes, railway lines; translate books from foreign languages; give information by telephone; diagnose patients. . . .

Now Svetlovidov was in charge. As the pencil ray of his pocket-torch pointer slid across the screen, he explained concisely and clearly how electronic computers helped scientists. They not only collected material, summed up the facts and thought up variants, but did creative work, finding new solutions to many problems. Computers had already found proofs to theorems that had never before entered any mathematician's head. They examined photographs, taken by physicists, of elementary particles, sorting them and stating their opinions. And the scientists, thanks to the brand-new discoveries made by their Brain Assistants and the resultant economy of time, were able to formulate . . . complicated theories which had been beyond man's comprehension.

The screens were switched off and they all saw that Svetlovidov was holding two small objects: one the size of a book, one like a small suitcase.

"These are also electronic computers," said Svetlovidov. "They are simple to operate and handy. Indispensable for engineers, philologists, archeologists and economists."

"And for schoolchildren. Very useful for prompting," put in Neznamov to the general delight of the children. Only while you children are feeding information to the machine, watch out—you'll find you've learned it all yourself!"

Svetlovidov, also smiling, turned back to the screens, touched a switch on the panel and took the audience into the spacious rooms of the Computer Centre—the country's Electronic Brain. Everything was planned here: freight transportation, agriculture, manufacturing and mineral output. The life-blood of the whole country was put into mathematical signs, programmed information. Day and night the lightning-speed computers solved thousands upon thousands of engineering problems—from those for the factory lathe and farm tractor to those of giant electric power stations—so that the country's mighty pulse should beat in even rhythm.

"As you see, cybernetics is all-powerful," Svetlovidov concluded. "Cybernetics was created in answer to the demand for improving the control of complicated processes and operations. But it becomes all-powerful only when it is united with other sciences. The electronic computers you have just seen free man from difficult and complex physical work, so that he has more time for creative thought."

And at this moment, new questions were illuminated:

TELL US ABOUT SELF-TEACHING MACHINES.

HOW CAN ONE BRING MAN AND MACHINE INTO CLOSER CONTACT?

CAN YOU MAKE AN ELECTRONIC MACHINE IN THE LIKENESS OF MAN?

"We shall ask Professor Gromov to handle these questions," announced the chairman. "Eugene Ivanovich Gromov lives in Siberia, and is not a frequent visitor to Moscow. But he has prepared a wonderful surprise for Moscow schoolchildren. However, the professor himself had better tell you all about it."

"First of all," began Professor Gromov, "I must warn you that the surprise referred to hasn't worked out as I planned. That is, it's a story with a sad ending."

He went on to tell the story about Electronic. The children's faces burned, their eyes sparkled. So that's the way he was, Electronic! Good for him, the little madcap! Just as if he were real! Alive! Just like themselves! . . . What a shame they could not see him now . . . shake hands . . . chat with him . . . run races with him. . . . Too bad! . . . So their thoughts ran.

They all sat very still when Gromov finished speaking.

"I am sure Electronic will show up when he is ready," remarked the chairman.

"But now, children, you shall have a pleasant surprise just the same. The next question—CAN MAN CONVERSE WITH ANIMALS—will be answered not by a scientist, or an engineer, but by one of yourselves. He is a seventh-former, Sergei Cheesekov, a future cyberneticist. He will tell you how to learn the languages of tigers, rhinoceroses, and other wild animals. Take the floor, Sergei!"

Many could not believe their ears. But a boy in a blue wind-breaker was actually walking over to the speaker's desk. The children from the Cybernetics Vocational smiled, some coughed significantly and looked at their classmate proudly. And Professor Gromov remembered the familiar surname. He laughed, squinted short-sightedly, and gave an encouraging nod to the small lecturer.

"Is it possible to talk with animals?" the latter began. "I must tell you. . . ."

"WAIT!" came a loud cry. "STOP! I want to explain everything. . . ."

Up the aisle ran a boy, shouting the words, waving his arms



desperately in the air. Some children jumped to their feet, others turned round to look. The chairman stood up. But Professor Gromov's pipe fell, as he dived into his pocket for his glasses.

### **CHEESEKOV—THAT'S ME...**

The first person Cheesekov saw as he ran into the great auditorium was the girl in blue. She was standing right at the door, leaning against one of the columns, and her eyes widened at the sight of Sergei. Then she turned to the platform, and her eyes grew wider still.

Sergei also stared at the platform, and paled. Behind the speaker's desk, in front of everybody—was ELECTRONIC!

Not realising what he was doing, Sergei burst from his place at the door and started running towards the long table and the strangers sitting there. He did not hear his terrible cry; his one desire was to get to the platform as quick as he could.

In the all-over silence, Sergei stood before the gray-haired chairman who gazed back in surprise. Hanging his head, Cheesekov said a few words that were barely audible:

"Cheesekov—that's me. . . ."

He had spoken in almost a whisper. But everybody heard him. And they at once noticed how much he resembled the boy who was to lecture. Neznamov looked first at one Cheesekov, then at the other, and for some reason did not utter a word.

"Twins!" said one of the onlookers, in a loud voice. "That's not fair play!"

"No, not twins!" the professor's voice rang out. Gromov stood up and went to the edge of the platform. "Don't jump to conclusions, friends. You'll understand it all in a minute."

Gromov's eyes shone. Only a few steps separated him from the boy who, a few minutes ago, had started his lecture under the name of Sergei Cheesekov. The professor turned to him.

"Now, my boy, would you please tell us what day of the week it was, on the first of January, 180?"

"It was a Friday," answered the boy, not hesitating even for a moment.

"The sum of three numbers is 43," the professor continued. "And the sum of their cubes is 17,299. What are the numbers?"

"Twenty-five, eleven, and seven," answered the boy, almost at once.

Then Gromov asked him to find the principal root, with an index of 20, of a number consisting of 42 digits. And again the answer came with astonishing quickness.

"A boy-computer?" suggested one of the older boys.

The professor gave a negative shake of the head.

All of a sudden somebody spoke up in a hesitating tone:

"Electronic?"

And everybody began to speak at once.

"That's right!... Electronic!... Electronic!... It's him!... So it is!... Look, it's really Electronic!..."

It was as if you were listening to a mountain landslide, or a glacier rumbling and crashing below—such a clamour broke out.

The chairman gripped the microphone and shouted:

"Intermission!"

## HE'S LAUGHING!

And Sergei still stood there, with lowered head.

In a flash, the professor and Electronic were surrounded by a crowd, eager and curious. Like a rolling snowball, the crowding dense circle grew and grew, as it slowly moved toward the door and finally, with difficulty, squeezed through to roll into the lobby. Neznamov and his colleagues retired to a small room backstage, for an animated discussion on what had occurred. Everybody left. But Sergei still stood there.

Somebody took his arm, and asked:

"Let's go, shall we?"

It was Taratar. Cheesekov glanced at the teacher, embarrassed. And turned away. Big, round tears rolled from his eyes.

"Come now! What's the use of crying about it?" Taratar said gently. "You wanted to hide your secret from everybody, and for a while you succeeded, thanks to the professor's wonderful artistry. But then hundreds of eyes looked at Electronic, and guessed who he was. And not only hundreds, but . . ." added Taratar vaguely, remembering Electronic's duel with the "Trainer"—and his own doubts.

But Sergei could not control his tears. And Taratar decided to let him cry it out. He stood a little apart, waiting. Finally, he said:

"Well now, follow me to the lobby! I hear some fun going on. You must get together with your Electronic."

"He's not mine at all," muttered Sergei, following the teacher reluctantly.

"You were friends," said Taratar. "Everybody knows that."

"Not much, we were friends," peevishly answered Sergei, keeping close behind Taratar.

"But you, yourself, decided that Electronic should become himself again. For my part, I think you should talk with him."

"Right," cried Sergei suddenly, and darted to the door. At first he saw only backs. Cheesekov bent down and ducked under somebody's elbow, stepped on people's toes, tapped someone on the back to move over, again ducked under and came up inside the circle. Right in the middle stood Gromov and Electronic, and in front of them—a rabbit, a turtle, a flamingo, a mouse and some other animals. They were not real, of course; they were boys and girls in masquerade costume, artists of the Pioneer Theatre, who put on shows for tiny tots. Incidentally, they had not been in the auditorium, and had only heard who Electronic was. They could hardly believe their eyes.

"Well, tell me then," insisted the rabbit. "Who am I?"

"You're a person wearing the mask of a scared rabbit," rasped Electronic.

"But I'm not scared at all!" said the small actress, indignant.

"And I never said you were," remarked Electronic. "But you're supposed to be a rabbit now, and a rabbit is always scared."

The children screamed with laughter.

"Electronic! And me?" asked the turtle.

"You're a clever turtle. You hide the golden key at the bottom of a pond, or you climb up on a stone and relate your whole life."

"And I?"

"You're a mouse. You're afraid of cats more than anything in the world!"

The actors exclaimed in surprise.

"It's all true. He guessed everything, though he's never seen our play. It's easy to see he's clever."

"But where's May?" asked the rabbit, shouting: "Ma-ay!"

"Here I am," rang out from behind the crowd.

The children parted to let the girl through.

"This is May, our best actress," the rabbit introduced them. "And this is Electronic."

"We're already acquainted," smiled the girl, and she took from her pocket a filmy kerchief with a smiling face and "Electronic" on it. "Do you recognise it?"

"Oho!" exclaimed Gromov, surprised. "It seems Electronic has many friends. Only I don't see his best one—Sergei Cheesekov."

Something seemed to be stuck in Sergei's throat. Stepping forward and swallowing hard, he muttered:

"Here I am."

"Well, well, well," said the professor gaily. "Here he is—Electronic's live double! And the reason for all this mix-up."

Cheesekov blinked, trying to keep from crying again like a baby.

"Let's forget the past," the professor offered amiably, clapping Cheesekov on the shoulder. "You should know Electronic's strong points. Tell everybody what they are."

Cheesekov smiled.

"He's the best mathematician in the world. The best magician. And he knows animal languages better than anyone."

"Really!" screeched the actress in the Rabbit Mask. "We'll soon find out! Look, Electronic, guess what I'm saying now!" And the rabbit roared terribly, frighteningly, as if he were a tiger: "Rrrrrrohr."

"Mugger-up, mugger-ump!" the turtle put in.

"Miaow, miaow. . ." demandingly miaowed the mouse, and then hissed like a cat: "Tzssssssh!!"

The onlookers began to laugh. But Electronic showed no emotion at the comedy. He did not so much as smile.

"Why doesn't he laugh?" shouted the actors. "We're acting for all we are worth—and he doesn't laugh!"

"You see," the professor spread his hands in confusion, "that's an oversight of mine." I did not think of giving Electronic feelings or emotions."

"But he's just the same as alive," cried the boys and girls noisily. "He should be able to laugh and smile and be happy. Must be somewhere inside him, and he doesn't know it!"

"Kids!" cried Sergei. "Let's make Electronic laugh!"

And he began to hop around Electronic on one foot, singing any funny thing that came into his head:

*Electronic, Electronic!  
Although he's hardly out of the nest,  
In all of the world he is the best—  
Mathematician and comic!*

All at once the young future biologists, cyberneticists, engineers and doctors forgot about the great roles ahead of them in science. They jumped like goats, flapped arms like roosters, wrestled like bears. They cackled, howled, roared, miaowed, sang, put thumbs to noses and made hideous faces. Some were shadow-boxing, others walked on their hands, still others balanced rulers and things on their noses. The merry tumult swelled.

Gromov let out an infectious burst of laughter. Coming up, Neznamov chimed in. And Taratar's moustache wiggled and shook. No one could keep from laughing or smiling.

The laughter swirled around the silent, unruffled Electronic. It entered into all and everyone, infecting them with excitement, joy and energy. Laughter! It was real. You could almost touch it. Only put out your hand and you could catch it—ha! ha! ha!

Pushing out of the spinning crowd, Makar Gusev, all dishevelled, roared in his bass voice, pointing at Electronic:

“Look! He’s laughing!!”

Electronic was beginning to smile. . . .

“Hurrah!” cried the children. “He is laughing. Hip, hip hurrah! . . .”

And all fell silent, because suddenly Electronic began jumping and dancing too, saying clearly and distinctly:

“Ha. Ha. Ha.”

Then he began to laugh in good earnest:

“Ha, ha, ha, ho, ho!”

He hopped, tapped his feet, and began to sing a song, making it up as he went along:

*There’s a City of Laughter and jolly good cheer,  
Full of houses and courtyards that strike you as queer—  
With roofs full of flowers,  
Balloons on all towers,  
Where fountains rain music,  
Trees fiddle out lyrics,  
And wizards play tricks.  
There grannies are tops with the skipping-rope,  
And grandads can run like the antelope;  
And cripples, rheumatic, could lead any band:  
With crutches as batons, in left or right hand,  
They drum out the beat on each bench in the land.  
There the Sun and the Moon sign a pact to unite,  
There the stars always shine whether daytime or night;  
Smiles sparkle all fizzy,  
Girls laugh till they’re dizzy,  
Boys howl—you would wonder*

*If laughter's not thunder.  
For everyone there's enough laughter and jest—  
Hail then to laughter! And down with the rest!*

And everyone joined in:

*Hail then to laughter! And down with the rest!*

Then they clapped the new song writer. Electronic bowed and, going over to Sergei, whispered in his ear:

"Verse is the most compressed form of giving out information. I never made up any before. I don't know how it came to me."

"You're the best poet in the world, Electronic," answered Cheesekov, with conviction.

Neznamov drew Gromov aside:

"To tell the truth, Eugene Ivanovich," he said, "I'm only beginning to realise what a remarkable creature your Electronic is."

"Imagine! I should never have guessed it myself," joked Gromov, putting his finger mockingly to his lips. "Sh . . . sh, keep it a secret."

Just then they were surrounded by the children, who looked furtively at the scientists but kept silent.

"What is it?" asked Gromov and Neznamov in chorus.

"Well, you see," said Taratar, acting as spokesman. "The children have a very big request to make. After all that's happened, couldn't you leave Electronic with us? . . . It isn't absolutely necessary to put him back in the portmanteau, is it? . . ."

Dozens of pleading, entreating, expectant eyes were fastened on Gromov.

"And what will he do, with you?" asked the professor.

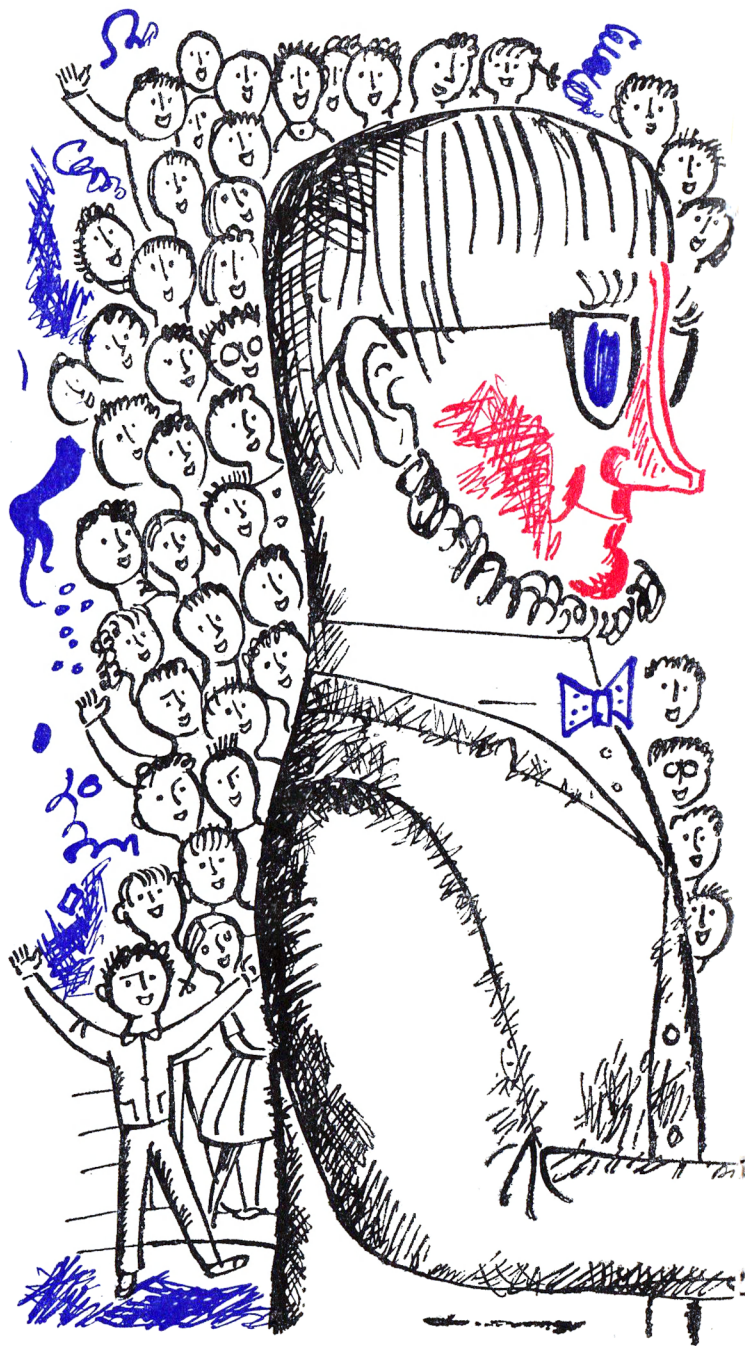
Cheesekov felt that the time had come for him to put in a word. A very important word, on which hung his friend's fate. He stepped forward.

"Electronic will help the teachers! He will coach us. He will give us tests. Eugene Ivanovich, you know what a wonderful mathematician he is!"





“Hurrah! Electronic’s ours!”



"Very well, I agree," said Gromov, simply.

Sergei beamed. And the small cybernetics specialists rejoiced.

"Hurrah! Electronic's ours!"

"One minute." Neznamov raised his hand. "Sometimes we must invite Electronic to the Institute of Cybernetics. We shall need his advice on several important questions. You don't object?"

"No, no. Of course we don't."

The girl in blue stood in front of Gromov, looked him in the eye, and said:

"Professor Gromov, you've given Electronic to the Cybernetics Vocational. Can you make us a girl-Electronic, for our School of Chemistry?"

The scientists looked at each other and laughed.

"Listen, May!" Makar interrupted, speaking as if he had known the girl forever. "Come over and spend some time with us—any time. We can all be friends with Electronic."

"May I, really?" asked May, turning for some reason towards Sergei, who was whispering something to Electronic.

Cheesekov caught his breath when May spoke to him. Before he had time to confirm what his sparkling eyes said for him, Makar butted in again.

"Of course, be sure to come, all of you. We don't tease girls. We'd be very happy to see you."

"I should, too," put in Sergei, colouring. "You know, May, I'm not going away after all. . . ."

## WHAT HAPPENED AFTER

The years went by. Sergei Cheesekov grew up, became a programmer, and left Moscow to work in another city. But he never forgot Electronic.

The school is still there in the courtyard off Linden Avenue. If anyone should return after many long years, and drop in while

a maths lesson is going on, he would see Electronic. He is just the same—he never grew up, never grew old, hardly changed at all. Well, perhaps he has changed. All these years, he not only taught the children along with Taratar and the “Trainer”, but he learned more himself. The teacher’s assistant had to keep up with the times.

And if you visit the Cybernetics Vocational after school hours, you will find Electronic in the Rest Room, or in the yard on a bench, surrounded by boys and girls. They laugh by the hour, listening to him. And he—oh, how many times!—tells them how he met his first friend, amazingly like himself. How he was Sergei Cheesekov for a whole two weeks. And Electronic never forgets to give the precise date and year it happened.

“That was still before the time man landed on Mars and settled there, before the Moon became an electric power station for Earth, before computers finally beat the World Chess Champion.”

“And what happened after that?” asked his impatient listeners.

And Electronic goes on to tell them how he made friends with May, the Professor, and Makar Gusev, and all the other children. How they discovered a new theorem, for some reason naming it “Electronic’s Theorem”. And the story of the mysterious breakdown of the “Trainer” excites his listeners, who are glad the children never gave up until they found the party responsible—Oleg Chubrikov. The “Trainer” had given him bad marks three times running.

And if you could hear how Electronic got sick once, you would not be able to keep from laughing. Somehow he decided he should pronounce “chicken” as “shicken” and “cement” as “shement”. And so on. The whole class gave him a course of treatment—and very tenderly too! Whatever you say, he had many adventures with his friends, old ones and new.

When the story-telling is over, the children play games. Electronic is wonderful now at shooting in goals. Then there is the

game where he pretends to be a Martian, hiding and running from the Earthmen, laughing and screaming. . . .

In the school at night, only one window shows a light. Late passers-by know that nobody is burning the midnight oil, that it is only Electronic. In his private study, he spends the whole night reading book after book. How the children envy him. Their books have to go under their pillows so they can sleep. And they have to stop at the most interesting place, too. . . .

So month after month goes by, year after year, without end. . . .

So, to this story, it is impossible to write:

THE END

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## **R E A D**

the following books for children published recently in English:

### **The Sun Princess and Her Deliverer (Lithuanian Folk Tale)**

In order to free his kidnapped sisters the Prince sets out to find the Sun Princess. Many had tried to reach her, but none had ever returned. The dragons and witches that guarded the beautiful Princess did away with all who approached her. But the birds and the beasts and the kind fairies came to the aid of the young Prince.

This Lithuanian fairy tale is illustrated with coloured engravings by A. Makunaite, a young Lithuanian artist, whose works have won many prizes at Soviet and international exhibitions of book illustrations.

## **SUTEYEV V. Stories and Pictures**

Suteyev is well known as an artist and writer of short tales for children. In this collection two angry chicks fight over a worm, naughty kittens crawl through a chimney pipe and become so black they cannot recognise each other, a silly little pup is worn out with the search for an animal that says "miaow"—dozens of animal children, sly or mischievous, angry or happy, are all busy at the amusing things they have to do.

